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ATLAS OF UNITED STATES TREES

Volume 3. Minor Western Hardwoods

by Elbert L. Little, Jr.



UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

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ATLAS OF UNITED STATES TREES

Volume 3. Minor Western Hardwoods

by

Elbert L. Little, Jr., Chief Dendrologist

**Timber Management Research
USDA Forest Service, Washington, D.C.**

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"Minor Western Hardwoods" is the third volume of an Atlas showing the natural distribution or range of the native tree species of continental United States. This volume contains large maps of 210 tree species native in western contiguous (or conterminous) United States. The area covered is all 11 far western contiguous States, Washington, Idaho, Montana, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, and New Mexico, also Trans-Pecos Texas. Coverage extends eastward for those species also in the row of six Midwestern States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Additional occurrence beyond is plotted on a map of North America. Among the 24 species with local distribution are 9 classed as endangered and 5 as threatened.

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ATLAS OF UNITED STATES TREES

VOLUME 3. MINOR WESTERN HARDWOODS

INTRODUCTION

This volume is the third of an Atlas with large maps showing the natural distribution or range of the native tree species of continental United States. "Atlas of United States Trees, Volume 1, Conifers and Important Hardwoods" (Little 1971¹) has an introduction to the series, which may be condensed and adapted here. The present project is to be completed by 1976 in five volumes. However, additional volumes on special subjects and revisions may be prepared later, as needed.

Maps demonstrate clearly and graphically where the trees grow wild better than written summaries and have many obvious uses. Assembled in atlas form for ready reference, these distribution maps are available to foresters, botanists, and all others interested in trees for use without restriction, since U.S. Government publications are not copyrighted. Users will render a service toward the improvement of the maps by reporting errors and range extensions. Review and correction is desired for a later, revised edition. The ultimate aim is to produce a set of highly accurate maps of wide acceptance.

The native tree species are not distributed across the United States at random, nor are they dispersed equally by States. However, some tend to occur in similar patterns related to climate and other factors. A brief summary of the contents follows. All volumes except the first are limited and arranged geographically.

Volume 1 contains maps of 200 native tree species, all the native conifers or softwoods, including the needleleaf and cone-bearing evergreens (94 species, also 2 shrub species) and the important hardwoods (106 species). Coverage is partly botanical and partly practical. Nearly all trees now important commercially for lumber are represented. Occurrence in Alaska is shown on maps of North America.

Volume 2, "Alaska Trees and Common Shrubs" (Viereck and Little 1975) has maps of Alaska for 82 native species, including 32 of trees, 6 of shrubs rarely reaching tree size, and 44 more of common shrubs. This special volume was needed because the northernmost and largest State is geographically separated from the others. It follows and supplements also "Alaska Trees and Shrubs" (Viereck and Little 1972). That handbook, primarily for identification, has descriptions, drawings, small maps, and additional information for 128 species, including the remaining shrubs. Occurrence outside Alaska is shown on North American maps in Volumes 1 and 3.

Volume 3, "Minor Western Hardwoods," contains maps of 210 tree species native in western contiguous (or conterminous)

United States but not in Volume 1. The area covered includes all 11 far western contiguous States, Washington, Idaho, Montana, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, and New Mexico, also Trans-Pecos Texas (the southwestern part west of the Pecos River; base map 2-SW). Coverage extends eastward for those western species also in the row of six Midwestern States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Thus, ranges are charted in 17 States. Also, occurrence of 15 species in Alaska is shown on maps of North America.

Volume 4, "Minor Eastern Hardwoods," will contain maps of about 170 tree species native in eastern contiguous United States not in previous volumes. The area covered extends west to include the row of six Midwestern States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. However, the tropical trees of southern Florida will be omitted. Also, the genus of hawthorns (*Crataegus*) has been left out because of taxonomic difficulties.

Volume 5, "Florida Trees," will have maps of about 100 species of tropical trees confined mostly to the southern part of that State. Also to be included are maps of the remaining tree species native in Florida, adapted from those in Volumes 1 and 4.

Another Forest Service publication, "The Distribution of Forest Trees in California" by James R. Griffin and William B. Critchfield (1972) has detailed maps of 86 species of that State, including the conifers and commercially important hardwoods and most other large trees. Those maps were begun some years earlier by the Vegetation Type Map (VTM) survey of California. Most of those species were mapped earlier in Volume 1 but with less detail in California. In Volume 3 the California ranges of 15 species are from that source. However, this Atlas volume has maps of about 85 additional tree species of that State, mostly of small size or shrubby.

The native tropical trees of Hawaii and the Commonwealth of Puerto Rico are best treated separately. Maps of 100 species in Puerto Rico based on a forest survey were published in "Common Trees of Puerto Rico and the Virgin Islands" (Little and Wadsworth 1964).

HISTORY OF TREE DISTRIBUTION MAPS

The history of tree distribution maps in the United States has been reported in Volume 1, while early work by the Forest Service has been reviewed by Little (1951). George B. Sudworth, first dendrologist of the USDA Forest Service, began work with the Bureau of Forestry in 1886. Tree ranges were

¹ Names and dates in parentheses refer to Selected References, p. 11.

summarized in the two editions of his "Check List of Forest Trees of the United States, Their Names and Ranges" (Sudworth 1898, 1927). "Forest Trees of the Pacific Slope" (Sudworth 1908) contains much detailed information about tree ranges.

Soon after establishment of the Forest Service in the United States Department of Agriculture in 1905, Sudworth undertook a project of preparing a distribution map for each native tree species of North America, exclusive of those occurring wholly in Mexico and minor tropical trees of southern Florida. Many thousand locality records for individual species were filed on separate cards from publications such as botanical lists and forest surveys, unpublished field notes, and herbarium specimens. For each species these localities were plotted by number on one or more large cloth-backed maps of contiguous United States, North America, or Alaska. These maps and card file are preserved in the dendrology project, Timber Management Research, USDA Forest Service, Washington, D.C.

Publication of these maps was begun by Sudworth (1913) under the title, "Forest Atlas—Geographic Distribution of North American Trees." Only "Part I—Pines" ever appeared. However, four bulletins on Rocky Mountain conifers by Sudworth in 1915–18 contain small species maps prepared for the larger reference. A fifth, posthumous bulletin (Sudworth 1934), has maps of poplars (*Populus*), principal tree willows (*Salix*), and walnuts (*Juglans*) of the Rocky Mountain region.

It is indeed unfortunate that Sudworth's entire Atlas, with a map for each of nearly 500 native tree species then distinguished, was not issued promptly, when representing current knowledge. Some years later, Munns (1938) published distribution maps of 170 important forest tree species of the United States. With minor additions, the maps were based very largely upon data by Sudworth, who died in 1927.

Besides "Volume 2, Alaska Trees and Common Shrubs" and the California reference cited above, other publications of the Forest Service have been devoted to maps of the trees of a single State. In 1941–50, its Forest Survey published distribution maps of commercial forest trees in four Southeastern States, Mississippi, North Carolina, South Carolina, and Virginia.

COVERAGE OF THIS VOLUME

"Atlas of United States Trees, Volume 3, Minor Western Hardwoods" continues "Volume 1, Conifers and Important Hardwoods." The Forest Service "Check List of Native and Naturalized Trees of the United States" (Little 1953) serves as a basis for the species included as trees, also their accepted scientific names and approved common names. That reference contains other common names in use ("Index of Common Names," p. 451–472) and current synonyms of the scientific names. Thus, names of species not found in this volume may be traced and correlated. Several minor changes in nomenclature made after publication of the 1953 edition are noted under "Tree Names" (page 6).

The Check List apparently is the only current compilation of the native woody-plant species which reach tree size and which should be mapped in this Atlas. Obviously, the number of tree species included here depends somewhat upon the definition used. That of the Check List (Little 1953, p. 5) is followed and repeated here, with insertion of approximate metric equivalents: Trees are defined as woody plants having one erect perennial

stem or trunk at least 3 inches (7.5 centimeters) in diameter at breast height (4½ feet or 1.4 meters), a more or less definitely formed crown of foliage, and a height of at least 12 feet (nearly 4 meters).

Large willows (genus *Salix*) with several trunks from the same root have been included. However, a few species of willow rarely recorded as trees have been excluded, as cited under "Tree Names."

Species whose individuals sometimes reach the above dimensions somewhere within their natural range have been included in this Atlas as well as the Check List. Many of the minor hardwoods mapped here are commonly smaller over most of their ranges and are regarded locally as shrubs. Several borderline species were mentioned in notes in the 1953 Check List. Most of those are described in current floras as becoming small trees and have been added here under "Tree Names." Inclusion of these shrubby trees has increased the number of maps and also time of preparation. Obviously, many species of large shrubs are excluded. Thus, the extra maps of this volume may be useful in the absence of a similar Atlas on the larger number of native shrubs.

Volume 3, "Minor Western Hardwoods," with 210 species aims to complete the maps of the tree species native within the 11 far western contiguous States from Washington to New Mexico, also Trans-Pecos Texas (the southwestern part west of the Pecos River; base map 2–SW). These States, mentioned previously, are Washington, Idaho, Montana, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, and New Mexico.

Thus, all native tree species listed within these 11 Far Western States are mapped within Volumes 1 and 3. Volume 1 has about 102 western tree species, all the western conifers, or cone-bearing softwoods, including the needleleaf evergreens, totaling 68 species (also 1 shrub) and also 34 species of hardwoods classed as important. As Volume 3 contains maps of 210 minor hardwoods, the total number of western tree species accepted in both volumes as native is approximately 312.

Volume 3 contains all remaining tree species native in the 11 far western contiguous States not in Volume 1. These trees are classed as angiosperms, or flowering plants. The term hardwood generally is used for trees of dicotyledons, flowering plants with trunks of bark and wood usually hard, which increases in thickness by annual growth rings. Also added to this volume are 12 tree species of monocotyledons, flowering plants whose trunks are not divided into bark and wood and whose less compact woody tissue does not increase in thickness by growth rings. These western monocotyledons, mostly of the Mexican border States, are included here for completeness, though technically not hardwoods. Nine southwestern species of *Yucca*, yucca, and *Nolina bigelovii*, Bigelow nolina, reach tree size. The only southwestern palm is *Washingtonia filifera* (Linden) H. Wendl., California Washingtonia. Another species, *Sabal mexicana* Mart., Mexican palmetto, barely reaches extreme southern Texas.

Covered in part is the row of six Midwestern States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Most tree species are clearly western or eastern, but several are widespread across the country. However, about 30 western species extend eastward into one or more of these six Midwestern States but not beyond. Thus, for convenience, the entire range of these species is shown on a single map in this volume. Also included here are about 15 species of subtropical

trees which extend northward from Mexico into southern Texas but no farther eastward.

Most tree species native in the six Midwestern States from North Dakota south to Texas are eastern in range and reach their western limits in one or more of these States. These eastern species not in Volume 1 will be in "Volume 4, Minor Eastern Hardwoods." Thus, the native trees of these six Midwestern States are to be found among Volumes 1, 3, and 4.

About 20 species of Volume 3 are widespread across the United States or else range both east and west of one or more of the six Midwestern States from North Dakota to Texas. The entire range of several is shown on a map of North America. Detailed maps of these species showing occurrence by counties in Eastern United States are in Volume 4.

For Alaska trees, Volumes 1 and 3 contain maps of North America showing the distribution beyond the 49th State into Canada and the lower 48. The detailed maps in "Volume 2, Alaska Trees and Common Shrubs" do not indicate occurrence outside. For completeness, North American maps are inserted here for these 2 species of Alaskan tree willows ranging into Canada but not southward: *Salix alaxensis* (Anderss.) Cov., feltleaf willow, and *Salix arbusculoides* Anderss., littletree willow. Volume 1 maps the general ranges of Alaska trees in North America for 17 species (12 conifers, 5 hardwoods) and Volume 3, 15 hardwood species, total 32. However, North American maps have not been compiled for 6 shrubby species (5 of *Salix*, willow, and 1 of *Alnus*, alder) rarely attaining tree size in Alaska.

The 210 species of minor western hardwoods (including 12 of monocotyledons) mapped in this volume are grouped in 83 genera and 36 plant families. A botanical index of genera and families appeared in the Check List (Little 1953, p. 445-450). Totals are incomplete, because important hardwoods are in Volume 1. Largest genera in Volume 3 are: willow (*Salix*), 21 species; oak (*Quercus*), 19; ash (*Fraxinus*), cherry—plum (*Prunus*), and yucca (*Yucca*), 9 each; sumac (*Rhus*), 8; and acacia (*Acacia*) and hawthorn (*Crataegus*), 7 each. Combined with Volume 1, the largest genera of western hardwoods are: oak (*Quercus*), 29 species; willow (*Salix*), 22; and ash (*Fraxinus*) and cherry—plum (*Prunus*), 10 each.

PREPARATION OF THE MAPS

The maps in this volume have been compiled from various sources, following the procedure explained in the first volume. Principal records on tree distribution include publications, herbarium specimens, field work, and review by botanists, foresters, and others. The more detailed publications consulted are listed under Selected References (p. 11). Credit is due many persons for their valuable assistance. The list of publications and persons consulted is too long for citation here. Naturally the compiler is responsible for all errors.

Publications with information about tree distribution have been examined for each State. These included tree guides, State floras or manuals, and catalogs. References for several States summarize tree species distribution accurately and in detail almost as precise as maps, such as by counties or counties along the border or, for rare species, by localities. In other States, scattered published floras with lists by counties or similar geographic units have been helpful in filling the gaps. The classic Manual by Sargent (1926) contains important locality records. Notes on range extensions are found in various

scientific periodicals. A few unpublished theses with local lists have been examined.

Published maps have been valuable sources in this compilation. Altogether, more than one-fourth of the States now have publications with distribution maps of all or most native tree species, as noted in the first volume (Little 1971, p. 5). These, with author and year, for 7 of the 18 Western States of this volume, are: Alaska (Hultén 1941-49, 1968; Viereck and Little 1972, 1974, 1975); Idaho (Johnson 1961); Montana (Booth and Wright 1962); Utah (Erdman 1970; C. M. Johnson 1970); Nebraska (Pool 1951); Kansas (Hitchcock 1899; Gates 1938; Stephens 1969); and Oklahoma (Williams 1973).

Other references treat larger areas. Maps of trees of southwestern deserts covered parts of California, Arizona, and New Mexico (Benson and Darrow 1945, 1954). Trees of the Sonoran Desert extending north into Arizona and southeastern California from Sonora and Baja California, Mexico, have been plotted in detail (Hastings, Turner, and Warren 1972). One recent publication shows dots for counties in four States, North Dakota, South Dakota, Nebraska, and Kansas (Stephens 1973).

"Index Holmensis, a World Index of Plant Distribution Maps" (Tralau 1969-74) cites published maps by species and will be valuable in future compilation. The first three volumes on gymnosperms and monocotyledons have several species charted here. Hardwoods will be covered in the remaining volumes on dicotyledons.

The ranges of many native tree species of Western United States continue northward into Canada and have been charted there. "Native Trees of Canada" (Hosie 1969) contains small maps of the forest tree species. Plants of Yukon Territory were included with Alaska by Hultén (1941-49, 1968). Two parts of the flora of British Columbia with maps of the rose family (Rosaceae) and the heather family (Ericaceae) have appeared (Szczawinski 1962; Taylor 1973). Also records of plant specimens of Queen Charlotte Islands were plotted (Calder, Taylor, and Mulligan 1968).

Among the most detailed published maps are those of taxonomic monographs and those of a single species based upon extensive field work, such as a doctoral thesis. Unfortunately, few tree species of Western United States have been so thoroughly studied. Examples of generic monographs with maps among the minor western hardwoods are: *Alnus* (Johnson 1969); *Amelanchier* (Jones 1946); *Artemisia* (Beetle 1960); *Bumelia* (Clark 1942); *Cercidium* (Carter 1974); *Cercis* (Hopkins 1942); *Fraxinus* (Miller 1955); *Prosopis* (Benson 1941; Johnston 1962); *Ptelea* (Bailey 1962); *Rhamnus* (Wolf 1938); *Rhus* (Barkley 1937); *Salix* in Alaska and Yukon (Argus 1973); *Yucca* (McKelvey 1938-47).

Also, a few publications about plant families have species maps. Two in the legume family, Leguminosae are: "The legumes of Texas" (B. L. Turner 1959); Subfamily Mimosoideae (Isely 1973). Similar maps are available in the cactus family, Cactaceae, for Arizona (Benson 1969). Also, *Aesculus* (Hardin 1957).

Examples of generic monographs with distribution data but without maps are: *Bumelia* (Cronquist 1945); *Bursera* (Porter 1974); *Citharexylum* (Moldenke 1958); *Condalia* (Johnston 1962); *Erythrina* (Krukoff 1939); *Sorbus* (Jones 1939); *Viburnum* (McAttee 1956); *Yucca* (Webber 1953). Special studies of one or few species may contain maps, for example, in *Quercus* (Tucker 1952; Tucker and Haskell 1960). Also, some studies of plant distribution contain maps, for example, McVaugh (1952).

Herbarium specimens have been an important source in preparation of the maps of minor western hardwoods. During a period of several years the compiler visited herbaria in 15 of the 17 States, mostly at universities. In 12 States he copied locality records from specimen labels in one herbarium, sometimes more.

Some State herbaria maintain unpublished card files of maps showing by dots where herbarium specimens were collected, either by counties or localities. In these six States, species maps with locality records of specimens kindly were made available or were compiled by the curators, as follows: North Dakota, O. A. Stevens; South Dakota, Theodore van Bruggen; Wyoming, John R. Reeder; Colorado, Robert P. Adams; New Mexico, William C. Martin; and Texas (incomplete), Billie L. Turner. Ronald L. McGregor provided numerous county range extensions from his forthcoming atlas of plants of the plains region. George W. Argus has assisted in the willow genus (*Salix*). Credit is due all curators for the privilege of consulting the herbaria and for their cooperation in supplying these records.

Similar records from publications, herbarium specimens, and maps have been obtained for distribution outside the United States. For Canada, the compiler consulted herbaria in Victoria, Vancouver, and Ottawa. Special acknowledgment is made for copies of unpublished maps, as follows: British Columbia, T. C. Brayshaw; Northwest Territories, W. J. Cody and A. E. Porsild. For Quebec the species maps and notes in the thesis by Camille Rousseau (1974) were especially helpful. The manuscript "Flora of Canada" by H. J. Scoggan, not yet published, was examined for valuable information on the distribution and northernmost records.

The compiler visited Herbario Nacional, Instituto de Biología, Universidad Nacional Autónoma de México in Mexico City, to copy locality records of specimens in that country. The flora of the region of the Río de Bavispe in northeastern Sonora (White 1948) near the border cited detailed localities of many species. Further information for many species was copied from specimens at the United States National Herbarium (US), of the National Museum of Natural History in Washington, D.C. That herbarium contains important collections from Mexico which served in the preparation of "Trees and Shrubs of Mexico" (Standley 1920-26). Many Mexican extensions have been contributed by Jerzy Rzedowski (general), Raymond M. Turner (Sonora), and Reid V. Moran (Baja California). Ranges and southern limits of some species in Mexico are less definite than northward because of fewer available specimens.

Additional records were available in the Forest Service. The unpublished maps compiled by George B. Sudworth have been reexamined for old records such as observations by foresters. Charles Feddema, curator of the Forest Service Herbarium (USFS), kindly has compiled locality records for many species. That herbarium has perhaps the largest number of specimens from the western National Forests.

Maps of vegetation, forest types, topography, and landforms have been very helpful in determination of lines along the borders of ranges. In the Western States, sharp limits of forests and climatic zones of vegetation are based largely upon differences in altitude. Regrettably, maps of the same region sometimes differ in their classifications and type boundaries. Forest type maps in color have been issued by the Forest Survey of the Forest Service for nearly all forested parts of the country in many scattered publications, mostly on the forest

resources of one State or smaller unit. Detailed vegetation maps have been published for a number of States.

In this Atlas volume the main source of vegetation boundaries has been the map Vegetation by A. W. Küchler, National Atlas Sheet No. 90 (U.S. Geological Survey 1970). This detailed, highly accurate map was reduced in size from a separately published one on the vegetation of conterminous United States with explanatory text (Küchler 1964). The map Forest Types, National Atlas Sheet No. 182, prepared by the Forest Service, has been useful and was reduced and adapted slightly for inclusion in the first volume as an overlay (overlay map 9, Major Forest Types).

Reduced or small-scale maps naturally do not show local variations of vegetation and plant distribution in detail. For example, a few small, isolated mountains with outlying stations for certain species have been omitted both from vegetation maps and from this Atlas. Further local occurrences may be indicated by the State vegetation maps printed at larger scales.

The compiler has had field experience in many parts of Western United States, including Alaska, also in Mexico. During 8 years, 1934 to 1941, he was in research work as assistant and associate forest ecologist in Arizona and New Mexico. Afterwards he prepared "Southwestern Trees, a Guide to the Native Species of Arizona and New Mexico" (Little 1950). Earlier, he was a student, teacher, and research worker in Oklahoma, also graduate student in Utah. Much information on landforms and vegetation has been obtained on field trips in various parts of the country, also from airplane and car windows across the different States.

These maps have been prepared through the years along with other work by the compiler and an assistant. Sources of most locality records were indicated on the working maps and could be traced if necessary. However, detailed record keeping and reproduction of hundreds of dots on most maps (such as by computers) would have added greatly to the time and cost of preparation without increasing the accuracy and would have delayed publication.

For assistance in preparation of the maps, credit is due Barbara H. Honkala, research botanist, who also made the cover design and the base maps, and Kathy M. Robinson. The final maps were drafted by Ziya K. Akalin, engineering draftsman.

EXPLANATION OF THE MAPS

Species maps of Volume 3 follow the general plan of Volume 1, from which this explanation is adapted and slightly condensed. However, like Volume 2, the page size has been reduced slightly to 9¼ by 11¾ inches. The obvious advantages include lower costs and prices, less weight, and greater convenience in handling and storing. The scale of the base maps of the United States remains the same in these volumes, 1:10,000,000. Thus, the maps can be compared readily. Also, the nine transparent overlays from Volume 1 can be adapted to Volumes 3 and 4, which have no overlays. The vast size of Alaska, more than twice that of the second largest State, is clearly emphasized in Volume 2, on the same scale, 1:10,000,000.

As in Volume 1, two base maps are used as needed for the 210 tree species in Volume 3, one of the United States for all (except 2 from Alaska) and another of North America for 62. These base maps have no lettering. However, place names are given on two additional base maps inserted for reference. Base

map 1 (in two parts, 1-NW and 1-SW) of Western United States has names of counties, also adjacent Provinces of Canada and States of northern Mexico. Base map 2-N of North America contains names of States of the United States, Provinces and other subdivisions of Canada, States of Mexico, and names of additional countries.

The base map of the United States is the same, scale 1:10,000,000, Albers Conical Equal Area Projection—standard parallels $29\frac{1}{2}^{\circ}$ and $45\frac{1}{2}^{\circ}$. Lines show State and county boundaries, also borders of adjacent Provinces of Canada and States of Mexico, and crosses at 5-degree intervals mark latitude and longitude. However, because of the reduced page size, this base has been trimmed into four smaller ones, two horizontal and two vertical. Two additional horizontal bases were drafted with extended borders, one northward through Vancouver Island, Canada, and the other southward to the end of Baja California, Mexico. On all these maps 1 inch equals approximately 158 miles and 1 centimeter, 100 kilometers.

The second base map, North America, is added for species whose natural range extends beyond the limits of the first. Thus, the entire distribution is included, with rare exceptions, such as species spreading into other continents. This one-page base map of North America represents a reduction to about one-third the scale of the United States base, roughly 1:32,000,000. Thus, 1 inch equals about 500 miles, and 1 centimeter about 320 kilometers. State and national boundaries, also principal rivers, and latitude and longitude are shown.

Base map 3, National Forest System and Related Data, shows the location of the 155 National Forests, which are widely distributed in 40 States, also the 19 National Grasslands in 12 States. Comparison with a tree species map will indicate the National Forests where that species may be expected. Many tree species occur also within specially managed smaller areas, such as experimental forests and research natural areas.

List of Maps (pages iii–vi) cites the number and order of maps of the 210 species. The order is alphabetical by scientific name. Thus, a map can be found quickly. Also, related species in the same genus are placed together. Index of Common Names and Index of Scientific Names follow the maps.

Each of the 210 species has a separate map, 70 also a second, and 6 of these also a third. Thus, the total is 286 maps, also 4 pages of base maps. The map of North America is added for 21 species whose natural range extends beyond the limits of the United States map northward into Canada or also Alaska and for 41, southward into Mexico or beyond.

Where there is more than one for a species, the number is followed by letters for the base map: W (Western United States, vertical), NW (Northwestern United States, horizontal), SW (Southwestern United States, horizontal), and N (North America). Fifteen species project vertically from north to south onto two horizontal maps. If a species has two, the maps are on facing pages. If three, that of North America precedes or follows the others. To avoid separating maps of a species, minor exceptions to alphabetical order were necessary, as noted under List of Maps.

The legend at the base of many maps contains additional notes. For species of local or limited distribution the names of States are mentioned. Also, occurrence beyond the map is indicated. The range of each species is summarized in the Forest Service Check List (Little 1953).

The natural distribution or range of a tree species, as mapped in this Atlas, is the geographical area where the species,

including any and all varieties, is native or wild. Varieties have not been plotted separately, and hybrids are omitted.

The distribution of the native tree species of the United States is mapped as of the present time, exclusive of changes caused directly or indirectly following settlement by Europeans. However, where modifications have occurred, the distribution is intended to be before Columbus, or pre-Columbian. For nearly all native tree species, the man-caused changes in range limits up to the present are believed to be negligible or recognizable. Most of the western half of the country has been settled less than a century. The commercial timber supply in the West is still partly from virgin forests. Vast areas of natural forests remain in the Western States, mostly in less accessible parts of the National Forests. In the East, including agricultural and urban areas, sufficient scattered trees and secondary forests remain to show the natural distribution. However, total destruction has taken place in cities and artificial lakes.

These maps do not show where a species grows outside the natural range after having been introduced directly or indirectly by man, whether planted, escaped, adventive, or naturalized. Records of planted or introduced trees outside the continuous natural ranges have not knowingly been mapped. Reports of trees planted for forestry, shade, or other purposes and of escapes from cultivation have been omitted. Also excluded are naturalized trees, those introduced outside their natural range and thoroughly established and reproducing as though native.

Perhaps in the future, maps adding forest plantations or other successful introductions beyond the original occurrence may merit compilation. In the meantime, maps of Plant Hardiness Zones, such as overlay 4 of Volume 1 (Little 1971; U.S. National Arboretum 1965), may suggest roughly where a species would be hardy when planted outside its natural range.

The natural geographic distribution of each species is shown as a brown shaded pattern of fine dots on the black-and-white base map. Outlying stations or outliers are plotted similarly by large or small dots according to size. However, the smallest areas, such as a grove with only a few trees, must be enlarged to a dot, representing several miles in diameter, to be visible on a map. Width of strips, such as along rivers, has been broadened slightly. A few localities beyond the main range, where a species is known to have occurred naturally within historic times but is now extinct, are designated by \times . Arrows have been added to direct attention to isolated dots.

Presence or absence is shown, but not abundance or density. Large areas within the main range where a species is known to be absent, for example, high mountains, are marked by borders or holes unshaded within. Commercial range, formerly indicated on some old maps, is not designated. Altitudinal limits, which vary in different latitudes, are not indicated.

The North American map of a species repeats on smaller scale the distribution pattern from the United States base. Additional dots beyond the main range in Canada and Mexico mostly are fewer and scattered and are enlarged for clarity.

The species maps do not indicate forest types, or forest cover types, which are the subject of overlay 9, Major Forest Types, in Volume 1. Most tree species are not confined to a single forest type and have ranges somewhat beyond. However, many species are characteristic of and largely within certain broad types. Published colored maps of vegetation and forest types have been mentioned. Colored maps of forest types are contained in forest survey publications by the Forest Service for States. The comprehensive classification of forest cover types

prepared by the Society of American Foresters (1954) lists species but lacks maps.

A few tree species have spread widely by planting or other introductions and have become so thoroughly naturalized that the limits of their original ranges are in doubt. Examples in this volume include three leguminous species, *Prosopis juliflora*, mesquite, *Acacia farnesiana*, sweet acacia, and *Parkinsonia aculeata*, Jerusalem-thorn. Other species with edible seeds or other useful products may have been disseminated by the American Indians, for example, *Prunus angustifolia*, Chickasaw plum.

TREE NAMES

Scientific and common names follow the Forest Service Check List (Little 1953), except for several minor changes in nomenclature. Differences in scientific names, mostly of additions and deletions, are given below, the accepted name cited first. Eight species of willow, *Salix*, have been deleted as synonyms or shrubs. The first eleven changes below involve four generic transfers and seven other names.

Caesalpinia mexicana A. Gray, Mexican poinciana, of Texas and Mexico, replaces *Poinciana mexicana* (A. Gray) Rose.

Fremontodendron californicum (Torr.) Cov., California fremontia, replaces *Fremontia californica* Torr.

Fremontodendron mexicanum Davidson, Mexican fremontia, replaces *Fremontia mexicana* (Davidson) Macbr.

Guaiacum angustifolium Engelm., Texas lignumvitae, of Texas and Mexico, replaces *Porlieria angustifolia* (Engelm.) A. Gray.

Acacia berlandieri Benth., Berlandier acacia, of Texas, replaces *A. xemoryana* Benth. The latter is the hybrid *A. berlandieri* × *greggii*.

Condalia hookeri M. C. Johnst., bluewood, of Texas and Mexico, replaces *C. obovata* Hook., an illegitimate name.

Dodonaea viscosa (L.) Jacq., hopbush, a shrubby tropical species north to Arizona, includes as a synonym *D. microcarya* Small, of Florida.

Esenbeckia berlandieri Baill., Berlandier esenbeckia, of Mexico, includes *E. runyonii* Morton, of extreme southern Texas.

Forestiera angustifolia Torr., Texas forestiera, of Texas and Mexico, includes *F. texana* Cory.

Quercus glaucoides Mart. & Gal., Lacey oak, of Mexico, includes *Q. laceyi* Small.

Quercus rugosa Née, netleaf oak, of Mexico and border States, is an older name for *Q. reticulata* Humb. & Bonpl.

The 20 additions which follow include three named as new to science and three formerly treated as varieties. The others are mostly large shrubs also reaching tree size.

Acacia rigidula Benth., becomes a small tree in Texas.

Acacia roemeriana Scheele, Roemer acacia, of Texas, reaches tree size.

Arctostaphylos pringlei Parry, Pringle manzanita, rarely attains tree size in Arizona.

Cercocarpus traskiae Eastw., Catalina cercocarpus, very rare and very local on Santa Catalina Island off the coast of southern California, formerly was regarded as a variety, *C. betuloides* var. *traskiae* (Eastw.) Dunkle.

Citharexylum berlandieri Robinson, Berlandier fiddlewood, is reported as rarely a tree (mentioned in a note in the 1953 Check List).

Cornus glabrata Benth., brown dogwood, of California and Oregon, becomes a small tree.

Eysenhardtia texana Scheele (*E. angustifolia* Pennell), Texas kidneywood, added as small tree (mentioned in note in 1953 Check List).

Lysiloma microphylla Benth., littleleaf lysiloma, added as small tree (mentioned in note in 1953 Check List).

Ostrya chisosensis Correll, Chisos hophornbeam, of Chisos Mountains, Texas, named in 1965.

Populus arizonica Sarg., Arizona cottonwood, of Texas to Arizona accepted as species.

Populus hinckleyana Correll, Hinckley cottonwood, of Texas, named in 1960.

Ptelea crenulata Greene, California hoptree, shrub of California, accepted as small tree.

Quercus ajoensis C. H. Muller, Ajo oak, of Arizona and Baja California, described as new in 1954.

Quercus dunnii Kellogg, Palmer oak, of Arizona, California, and Mexico, formerly was treated as a variety, *Q. chrysolepis* Liebm. var. *palmeri* (Engelm.) Sarg.

Quercus macdonaldii Greene, McDonald oak, of three California islands, formerly was treated as a variety, *Q. dumosa* Nutt. var. *macdonaldii* (Greene) Jeps., or hybrid. *Q. dumosa* Nutt., California scrub oak, is omitted as a shrub. Another former variety reaching tree size is now accepted as a hybrid, *Quercus xalvordiana* Eastw., Alvord oak, and not mapped.

Quercus tardifolia C. H. Muller, lateleaf oak, of Chisos Mountains, Texas, named in 1936 and mentioned in note in 1953 Check List. Cited under *Q. gravesii* Sudw. and not mapped separately.

Rhus microphylla Engelm., littleleaf sumac, a shrub from Oklahoma to Arizona and Mexico, accepted as small tree (mentioned in note in 1953 Check List).

Sorbus scopulina Greene, Greene mountain-ash, from California to Alaska, observed to reach tree size in Alaska.

Vauquelinia pauciflora Standl., a shrub of southeastern Arizona, added as small tree.

Viburnum trilobum Marsh. (*V. opulus* L. var. *americanum* Ait.), American cranberrybush, becomes a small tree.

The last 15 names involve omission or deletion of names, mostly through union of two species or rejection as a shrub. In the next nine below, the second of two species, both accepted in the 1953 Check List, has been united and reduced to a synonym of the first.

Amelanchier alnifolia (Nutt.) Nutt., western serviceberry (formerly saskatoon serviceberry), includes *A. florida* Lindl., Pacific serviceberry.

Crataegus columbiana Howell, Columbia hawthorn, includes *C. williamsii* Eggl., Williams hawthorn.

Crataegus douglasii Lindl., black hawthorn, includes *C. rivularis* Nutt., river hawthorn.

Ptelea trifoliata L., common hoptree, includes as synonyms or varieties *Pt. angustifolia* Benth., narrowleaf hoptree, and *Pt. pallida* Greene, pale hoptree.

Salix exigua Nutt., coyote willow, includes *S. interior* Rowlee, sandbar willow.

Salix hookeriana Barratt, Hooker willow, includes *S. amplifolia* Cov., Yakutat willow, of Alaska.

Salix lasiandra Benth., Pacific willow, includes *S. caudata* (Nutt.) Heller, whiplash willow.

Salix nigra Marsh., black willow (Atlas, Vol. 1, maps 190-N, 190-W, and 190-E), includes *S. gooddingii* Ball, Goodding willow, of Southwestern United States and adjacent Mexico, and is shown on revised maps.

Salix sitchensis Sanson, Sitka willow, includes *S. coulteri* Anderss., Coulter willow.

These four species of willow, *Salix*, accepted in the 1953 Check List are omitted as shrubs only rarely reported to attain tree size:

Salix ligulifolia (Ball) Ball, strapleaf willow.

Salix lutea Nutt., yellow willow.

Salix melanopsis Nutt., dusky willow.

Salix padophylla Rydb., serviceberry willow, now a synonym of *S. monticola* Bebb, park willow.

Leucaena greggii S. Wats., Gregg leadtree, of Mexico, is omitted, having been reported also from Texas in error.

Quercus undulata Torr., wavyleaf oak, has been omitted as a hybrid of *Q. gambelii* Nutt., Gambel oak.

NOTES ON RANGES

Some observations on tree distribution may be noted from the maps of the 210 species in this volume. However, analyses of the ranges are outside the scope of the Atlas. An attempt has been made to record where each species grows naturally now, not to explain or speculate how and why.

Many western tree species are confined to the States along the Pacific Coast, California, Oregon, and Washington. Others are inland through the Rocky Mountains. A prominent element of the western hardwoods is found along the Mexican border from southeastern California through parts of Arizona and New Mexico to southwestern Texas. These mostly small trees are found at low altitudes in the southwestern desert and mountain regions. Additional subtropical species of northeastern Mexico spread northward into southwestern, southern, and sometimes central Texas.

Many maps show distinctive or unusual ranges. Especially noteworthy are the species of farthest geographic extent and greatest variation in environmental conditions. Some species may be widely adapted to many types of climates. Others apparently are composed of geographic races.

Relatively few species have broad east-west distribution nearly across the continent and can be classed as transcontinental. At least 21 of this volume extend eastward beyond the maps of the 18 Western States. Eastern ranges of the same species will be shown in Volume 4. These minor hardwood species of broad east-west distribution are listed below.

Amelanchier alnifolia, western serviceberry

Bumelia lanuginosa, gum bumelia

Cephalanthus occidentalis, common buttonbush

Cercis canadensis, eastern redbud

Cornus stolonifera, red-osier dogwood

Corylus cornuta, beaked hazel

Crataegus succulenta, fleshy hawthorn

Prunus americana, American plum

Prunus angustifolia, Chickasaw plum

Prunus pensylvanica, pin cherry

Prunus virginiana, common chokecherry

Ptelea trifoliata, common hoptree

Rhus glabra, smooth sumac

Salix bebbiana, Bebb willow

Salix discolor, pussy willow

Salix exigua, coyote willow

Salix nigra, black willow

Salix petiolaris, meadow willow

Sapindus drummondii, western soapberry

Viburnum lentago, nannyberry

Viburnum trilobum, American cranberrybush

Thirteen species of minor western hardwoods in Volume 3, including 4 of the previous list, have a broad geographical occurrence in Western North America from Alaska southeast across western Canada to the lower 48 States. In Volume 1, 13 species of conifers (also 1 shrubby) and 5 of important hardwoods have similar ranges. Many of these are found in the coastal forests from southern or southeastern Alaska south along the Pacific Coast of British Columbia to Washington or beyond to Oregon or California. A few are characteristic of the interior forests of Alaska and Rocky Mountains southward. The Alaska distribution is shown in detail in Volume 2. A list of these species follows:

Acer glabrum, Rocky Mountain (Douglas) maple

Alnus sinuata, Sitka alder

Alnus tenuifolia, thinleaf alder

Amelanchier alnifolia, western serviceberry

Malus diversifolia, Oregon crab apple

Salix bebbiana, Bebb willow

Salix hookeriana, Hooker willow

Salix lasiandra, Pacific willow

Salix scouleriana, Scouler willow

Salix sitchensis, Sitka willow

Sambucus callicarpa, Pacific red elder

Sorbus scopulina, Greene mountain-ash

Scorbus sitchensis, Sitka mountain-ash

Five shrubby species of Volume 3 are native from Canada southward across the United States to Mexico, as follows:

Artemisia tridentata, big sagebrush

Cephalanthus occidentalis, common buttonbush

Cornus stolonifera, red-osier dogwood

Rhus glabra, smooth sumac

Sambucus glauca, blueberry elder

One of the above, *Cornus stolonifera*, red-osier dogwood, reaches from central Alaska across Canada to Newfoundland and south to the Northeastern States as well as mountains of northern Mexico. Another, *Rhus glabra*, smooth sumac, is the only species classed as sometimes reaching tree size and native in all 48 lower States. However, it has been found in California only once and in Nevada at only two localities.

Nearly all tree species of this volume are confined to North America. However, a few tree species, mostly northern or subtropical, extend beyond. Examples are willows (*Salix*), across interior Alaska into northeastern Asia. *Cephalanthus occidentalis*, common buttonbush, ranges from southeastern Canada and New England to Canada and south through Mexico into Central America and into Cuba. The same or a closely related species is recorded from eastern Asia.

Several subtropical species of small trees of the Mexican border region extend southward into South America. *Koeberlinia spinosa*, allthorn, a desert species, reappears in deserts of Bolivia along with a few associated shrubs. *Dodonaea viscosa*, hopbush, including several varieties, is widespread also in the Old World tropics.

The number of tree species native in an area obviously increases from North to South. For example, Alaska, the largest State, has only about 20 tree species of hardwoods, also 6 more rarely reaching tree size (also conifers totaling 12 tree species and 2 shrubby), as mapped in Volume 2.

The 5 Northwestern States of Washington, Oregon, Idaho, Montana, and Wyoming together contain about 50 tree species

of hardwoods in Volumes 1 and 3 of which about 40 are mapped in this volume. In contrast, New Mexico has about 70 or more tree species of native hardwoods and Arizona, 95. Totals in California and western Texas are even larger.

The great variation in altitude is one of the most significant factors in the distribution of tree species in Western United States. As a result, the ranges of many species are irregular, broken, and discontinuous, especially southward. Many species are characteristic of certain zones of climate and vegetation, which rise from near sea level in the North to mountain summits in the South. Overlay 3, Topographic Relief, in Volume 1, has contour lines, which may indicate some relationships in distribution.

RARE AND ENDANGERED WESTERN HARDWOODS

The maps of this Atlas show clearly which tree species are confined to limited geographic areas. From these trees of local occurrence, lists of rare and endangered species may be compiled. The subject of rare and endangered trees is being treated in a series of separate publications.

The first report, "Rare and Local Conifers in the United States" (Little 1975) is based upon Volume 1 and contains maps of 35 species from that source. Similarly, the species maps of Volume 3 reveal much information about rare and endangered hardwoods in western continental United States. A summary may be appropriate here.

The Endangered Species Act of 1973 (U.S. Public Law 93-205, approved December 28, 1973) directed the Smithsonian Institution to prepare a list of endangered and threatened plant species, to review methods of adequately conserving these species, and to report the Institution's recommendations to the Congress. Accordingly, the Secretary (Smithsonian Institution 1975) presented to the Congress on December 15, 1974, its 200-page "Report on Endangered and Threatened Plant Species of the United States." As explained in the foreword by Secretary S. Dillon Ripley, this report provides lists of endangered, threatened, recently extinct, and exploited species of native plants of the United States.

The preliminary lists for continental United States comprise about 10 percent of the flora, 2,099 species (including some varieties and subspecies). Fortunately, the number of tree species and varieties is small, only about 32 (also 11 varieties), of which 14 are western hardwoods mapped in Volume 3. However, the number of species of rare trees is somewhat larger.

Next, a few definitions. A *rare* species has small numbers of individuals throughout its range, which may be restricted or widespread. The term *local* (also *endemic*) species is used here for a species of relatively small range, such as a small part of a State or a few islands. *Border* or *peripheral* species reach the limit of their natural range a short distance into the United States, for example, from Mexico into the Southwest. An *extinct* species (recently or possibly extinct) is no longer known to exist after repeated search of the type locality and other known or likely places.

As defined in the Act, "the term *endangered species* means any species which is in danger of extinction throughout all or a significant portion of its range . . ." "The term *threatened species* means any species which is likely to become an

endangered species within the foreseeable future throughout all or a significant portion of its range."

About 60 species of minor western hardwoods of the 210 mapped in Volume 3 have relatively small ranges in the United States and may be classed under one or more of the above terms. Also, several rare varieties are not mapped separately or mentioned here. Of these, 34 species are border or peripheral species mostly widespread south of the border in Mexico and thus not endangered at present. No tree species of Volume 3 is classed as extinct. However, a border species noted below apparently is extinct except in cultivation and in Mexico.

The 26 species of hardwoods with local distribution in western continental United States, as mapped in Volume 3, may be grouped geographically in the five lists below. The 9 on the endangered list compiled by the Smithsonian Institution and the 5 on the threatened list are designated.

Trans-Pecos Texas

Leucaena retusa, littleleaf leadtree
Ostrya chisosensis, Chisos hophornbeam (threatened)
Populus hinckleyana, Hinckley cottonwood (endangered)
Quercus graciliformis, Chisos oak (endangered)
Quercus tardifolia, lateleaf oak (endangered)

Arizona-California

Cereus giganteus, saguaro
Condalia globosa, bitter condalia
Fraxinus gooddingii, Goodding ash (endangered)
Rhus kearneyi, Kearney sumac (endangered)
Vauquelinia pauciflora, vauquelinia (threatened)
Washingtonia filifera, California washingtonia

California

Fremontodendron mexicanum, Mexican fremontia (endangered)
Juglans californica, California walnut
Juglans hindsii, Hinds walnut (endangered)
Prunus fremontii, desert apricot
Quercus engelmannii, Engelmann oak
Rhus integrifolia, lemonade sumac
Rhus laurina, laurel sumac

Channel Islands of California

Ceanothus arboreus, feltleaf ceanothus (threatened)
Cercocarpus traskiae, Catalina cercocarpus (endangered)
Lyonothamnus floribundus, lyontree (endangered)
Prunus lyonii, Catalina cherry
Quercus macdonaldii, McDonald oak
Quercus tomentella, island live oak (threatened)

Oregon-California

Salix fluviatilis, river willow (threatened)
Salix tracyi, Tracy willow

The 34 border or peripheral species mostly widespread south of the border in Mexico may be arranged geographically in the three lists below. Though of limited distribution in the United States, these species, with one exception, are not endangered or threatened with extinction. Nevertheless, some may merit special protection in this country. *Berlandier esenbeckia*, *Esenbeckia berlandieri*, apparently is extinct in extreme southern Texas except in cultivation, though not endangered in Mexico.

Border Species of Texas

Caesalpinia mexicana, Mexican poinciana
Citharexylum berlandieri, Berlandier fiddlewood
Cordia boissieri, anacahuita
Cercidium macrum, border paloverde
Ehretia anacua, anaqua
Esenbeckia berlandieri, Berlandier esenbeckia (extinct in U.S. except in cultivation)
Fraxinus greggii, Gregg ash
Leucaena pulverulenta, great leadtree
Pistacia texana, Texas pistache
Pithecellobium flexicaule, ebony blackbead
Pithecellobium pallens, huajillo
Quercus gravesii, Graves oak
Sabal mexicana, Mexican palmetto
Yucca carnerosana, Carneros yucca
Yucca faxoniana, Faxon yucca
Yucca rostrata, beaked yucca

Border Species of Southeastern Arizona (mostly within Coronado National Forest)

Arbutus arizonica, Arizona madrone
Erythrina flabelliformis, southwestern coralbean
Eysenhardtia polystachya, kidneywood
Fraxinus papillosa, Chihuahua ash
Quercus hypoleucoides, silverleaf oak
Quercus oblongifolia, Mexican blue oak
Quercus rugosa, netleaf oak
Quercus toumeyii, Toumey oak
Salix bonplandiana, Bonpland willow
Salix taxifolia, yewleaf willow
Vauquelinia californica, Torrey vauquelinia
Yucca schottii, Schott's yucca

Border Species of Southwestern Arizona Deserts

Bursera fagaroides, fragrant bursera
Bursera microphylla, elephanttree
Forestiera phillyreoides, desert-olive forestiera
Parkinsonia aculeata, Jerusalem-thorn
Quercus ajoensis, Ajo oak
Sapium biloculare, jumping-bean sapium

APPLICATIONS OF THE MAPS

Several applications of these maps of minor western hardwoods may be repeated from Volume 1, though most uses are obvious. First, the maps show where each tree species grows wild and can be found for study for any purposes. Also, where plantations or trees from locally collected seed should be successful.

To specialists, the maps may reveal errors and suggest corrections, also likely localities where further field work is needed for revision and where range extensions and State records may be sought. The natural ranges are preserved for the historical record, before the forests are destroyed or partly replaced by plantations of improved varieties and hybrids. The maps have economic value, suggesting possible sources of wood and other products in addition to the detailed information on timber volumes provided by forest surveys.

The transparent overlays (Volume 1) and maps together summarize graphically the average and extreme conditions of

the environment (temperature, precipitation, latitude, altitude, etc.) of each species. They provide the basis for correlation studies of distribution of a species and the environment, including limiting factors. Also, these maps may indicate local climates to which geographical or local races may be adapted.

The maps are of special importance in the collection of seed. They show first the geographic areas and localities where seed can be collected from wild trees. They suggest the possible occurrence of geographic races and seed sources, particularly for tree improvement programs including hybridization tests and for testing or introduction beyond the native range, such as foreign countries with similar climates.

Maps can be helpful in identifying wild trees, indicating the presence or absence of a species in a particular area. For tree identification a new handbook with revised small maps is planned.

Finally, the maps serve as background material for such studies as classification, evolution, paleobotany, and genetics. Also, the distribution of associated animals and plants, particularly insects and parasitic fungi.

FUTURE WORK

A revised Atlas with highly accurate maps of the native tree species of continental United States could be compiled at an early date after additional field work in many places. Future human activities may affect tree distribution and obscure the natural ranges. Some forests are being removed by cultivation and other land-uses, while others will be replaced by plantations of improved tree varieties and hybrids. A few species may become extinct at outlying stations or be restricted by insect pests or diseases. Others may migrate and shift their ranges in response to climatic cycles and other factors. Thus, these maps showing natural ranges at present may have additional, historical significance in the future.

Unpublished notes and publications on tree distribution, including range extensions and corrections, will be welcome at any time. Such material may be addressed to the Dendrologist, USDA Forest Service, Washington, D.C. 20250.

There is still a need for more articles, bulletins, and books devoted to distribution maps of native tree species prepared by experienced resident botanists or foresters in those States not already covered by references.

Botanists and foresters are urged to publish promptly articles containing records on range extensions of trees from their collections, herbaria, or observations. Duplicate specimens confirming these records should be deposited in one or more large herbaria, as well as in the State or institution herbarium. Care should be taken in all distribution records including maps and herbarium labels to distinguish between wild trees apparently native and trees introduced into the locality directly or indirectly by persons, whether planted, escaped, adventive, or naturalized.

SUMMARY

"Minor Western Hardwoods" is the third volume of an Atlas showing the natural distribution or range of the native tree species of continental United States. This volume contains large maps of 210 tree species native in western contiguous (or conterminous) United States and not among the 34 important western hardwoods in Volume 1.

The area covered is all 11 far western contiguous States, Washington, Idaho, Montana, Oregon, California, Nevada, Utah, Wyoming, Colorado, Arizona, and New Mexico, also Trans-Pecos Texas. Coverage extends eastward for those species also in the row of six Midwestern States of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, and Texas. Thus, ranges are charted in 17 States.

The maps have been compiled from various sources, following the procedure reviewed in the first volume. These include publications, herbarium specimens, field work, and review by botanists, foresters, and others. Credit is due many persons for their valuable assistance. Maps of vegetation, forest types, topography, and landforms have been very helpful in determination of lines along borders of ranges.

The species maps follow the general plan of Volume 1. The scale of the base map of the United States is the same, 1:10,000,000, though the page size has been reduced slightly. The second base map, North America, is added for 62 tree species whose natural range extends beyond into Canada or Mexico. Natural geographic distribution of each species is

shown as a brown shaded pattern of fine dots on the black-and-white base map. Outlying stations are plotted by large or small dots.

Order of maps is alphabetical by scientific name. Common and scientific names follow the Forest Service Check List (1953), except for several minor changes in nomenclature.

Notes on ranges are included. At least 21 species have broad east-west distribution. Thirteen range from Alaska to the lower 48 States. Five shrubby species are native from Canada southward across the United States to Mexico. The number of tree species native in an area obviously increases from north to south. The great variation in altitude is one of the most significant factors in the distribution of tree species in Western United States.

Rare, local, and endangered species are listed. As mapped, about 60 species of minor western hardwoods have relatively small range in the United States. Of these, 34 are border or peripheral species mostly widespread in Mexico. Among the 26 species with local distribution are 9 on the endangered list and 5 on the threatened list.

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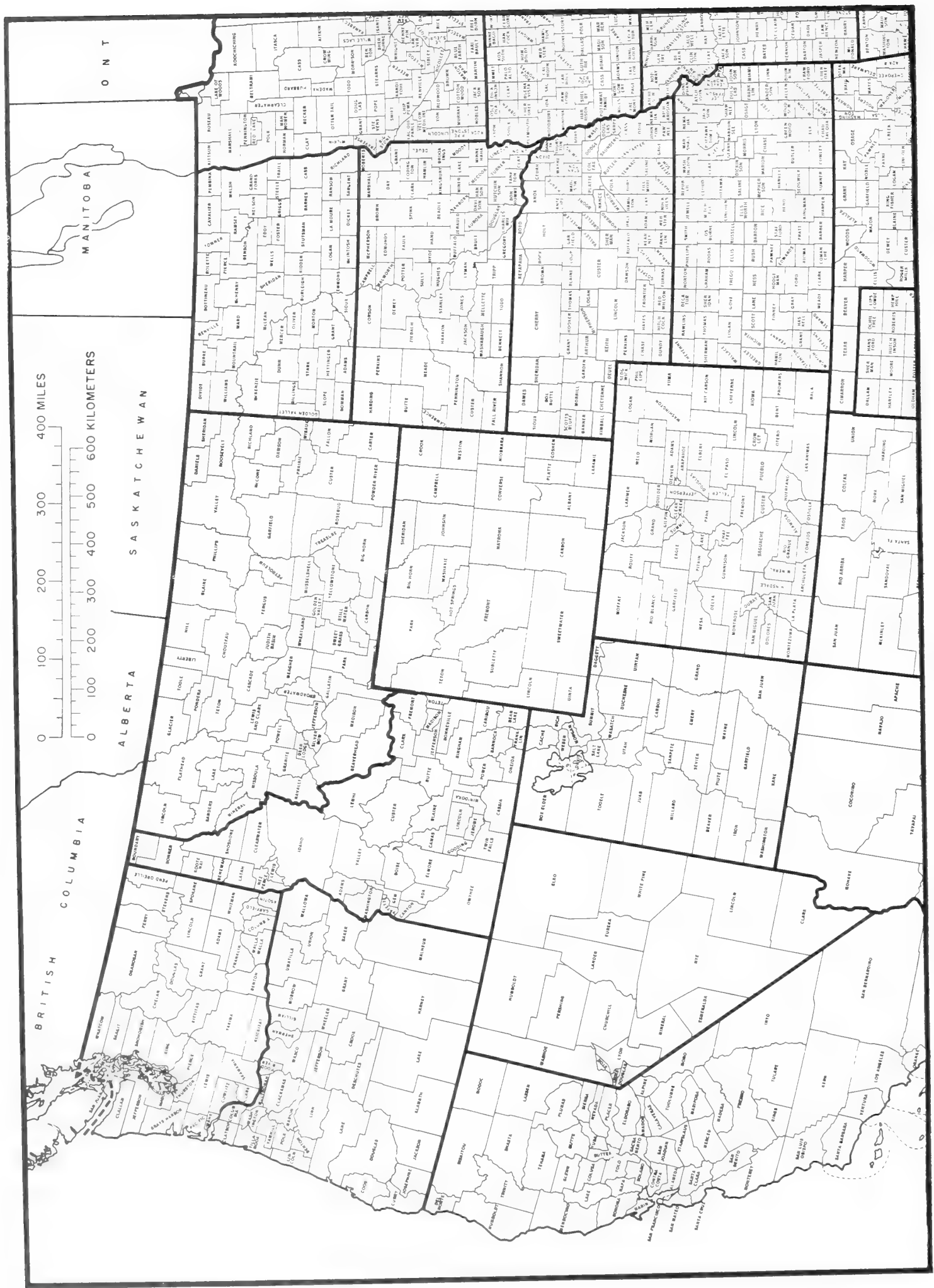
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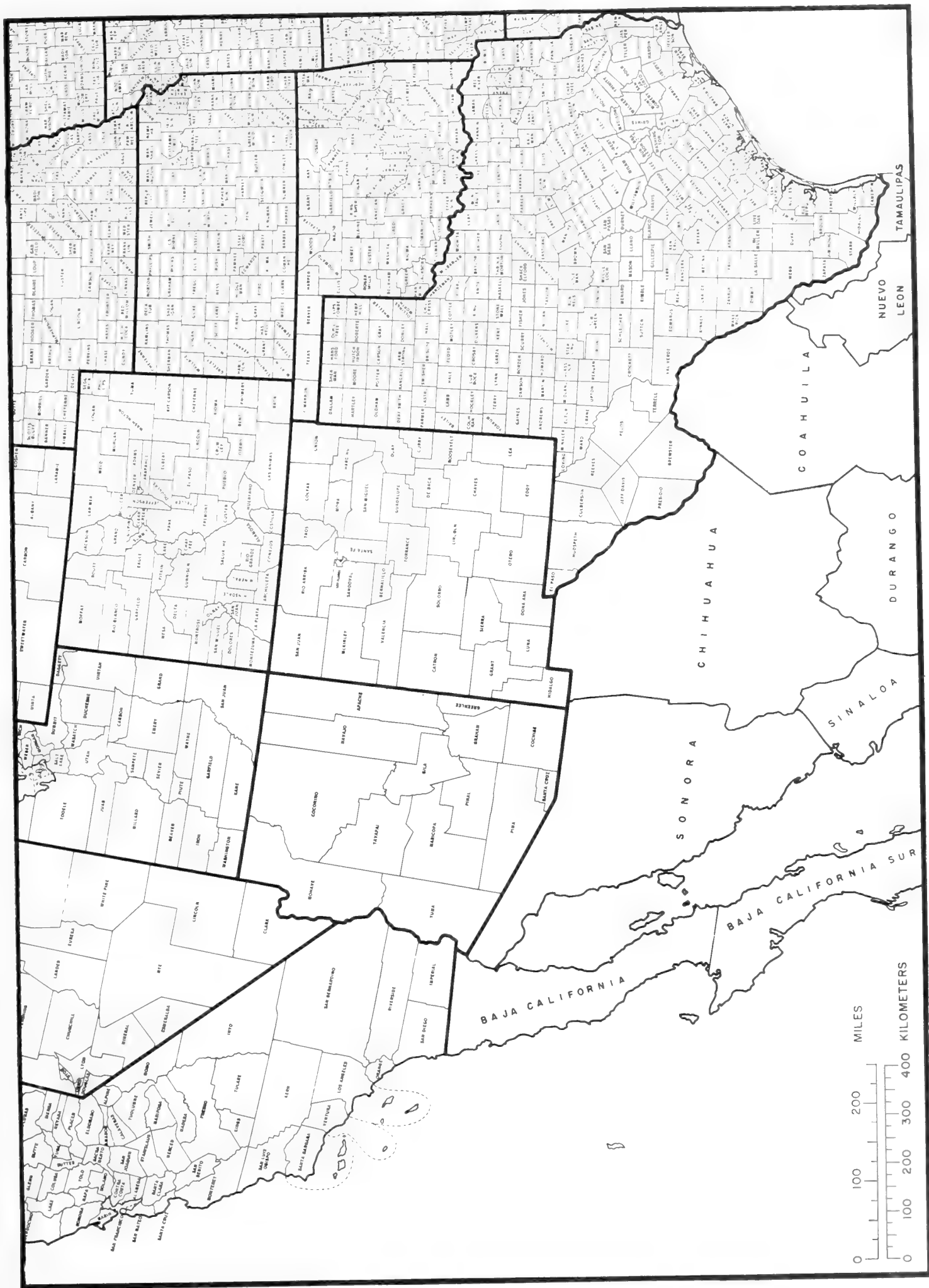
MAPS

Base Maps 1-3

Species Maps 1-210



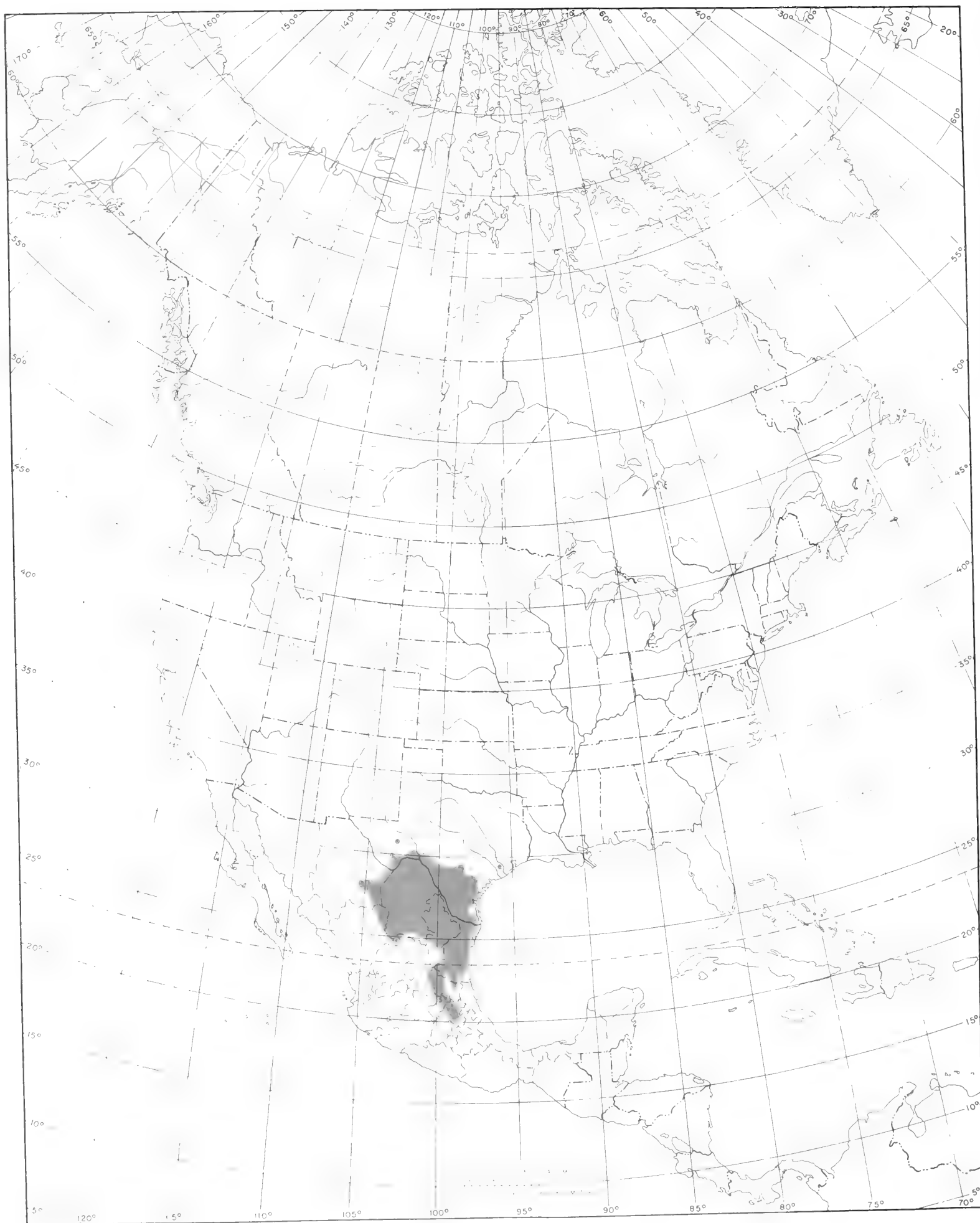
Base Map 1-NW. Western United States (contiguous). Base map with names of counties, Provinces of Canada, and States of the northern part of Mexico.



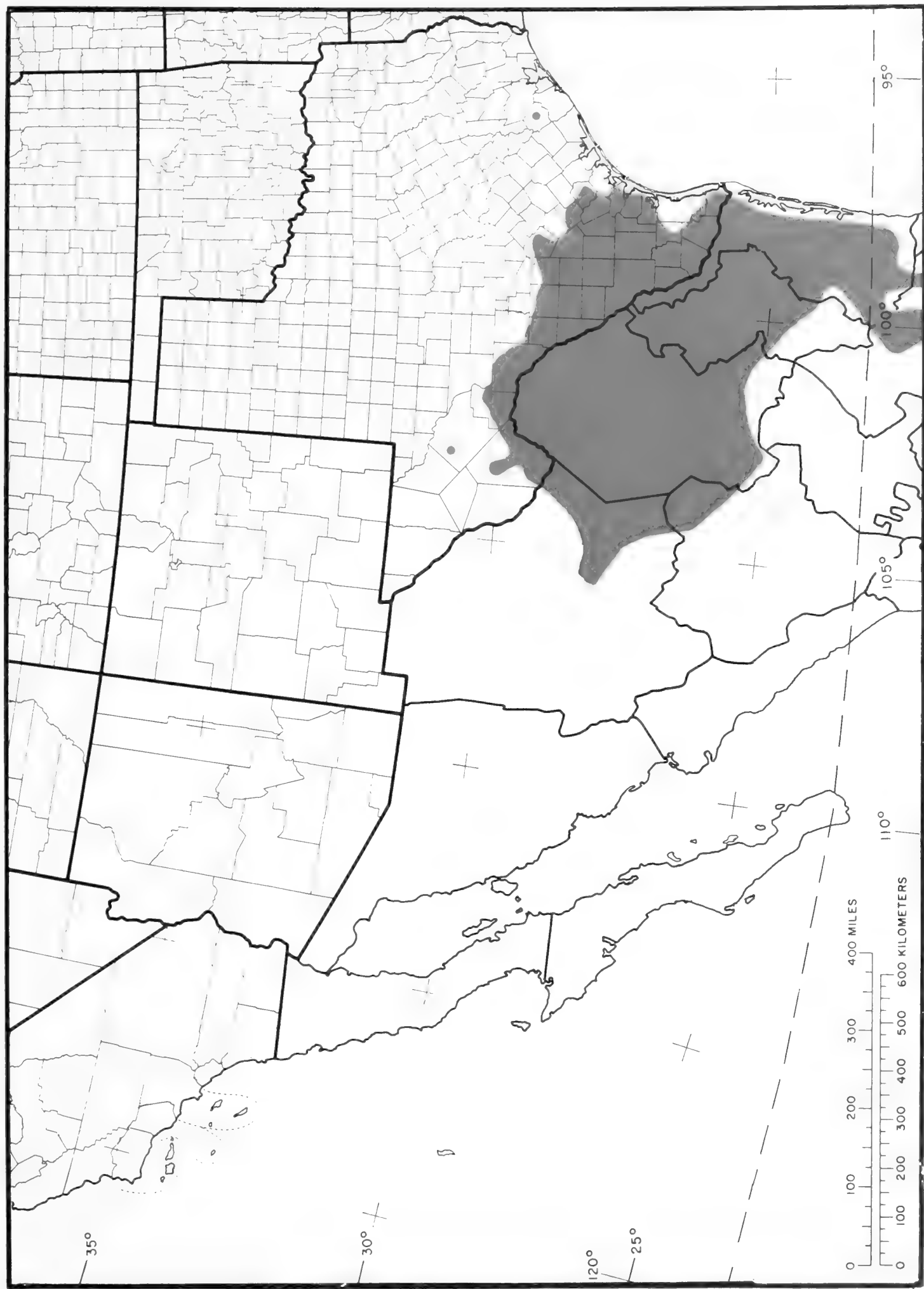
Base Map 1-SW. Western United States (contiguous). Base map with names of counties, Provinces of Canada, and States of the northern part of Mexico.



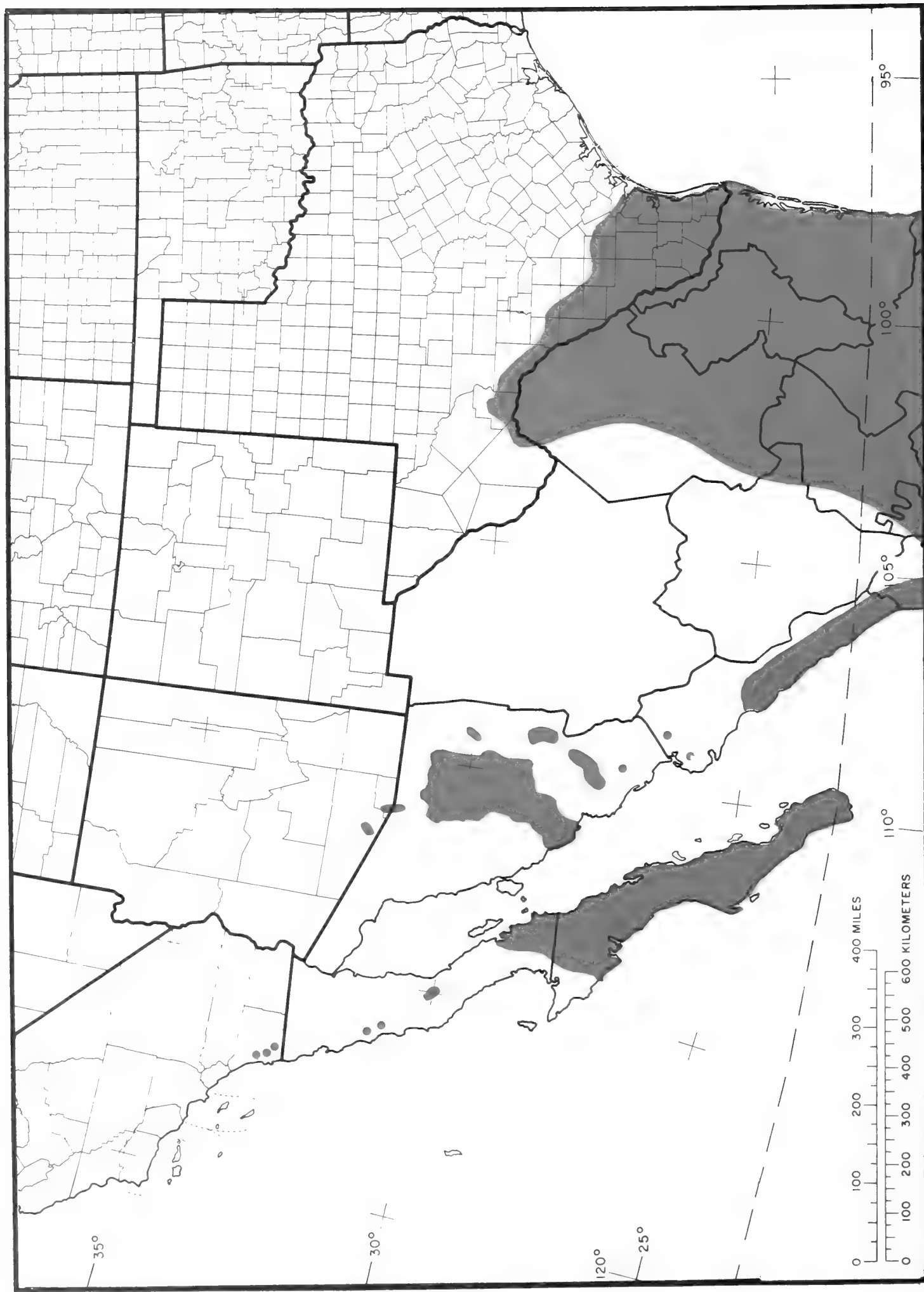
Base Map 2-N. North America. Base map with names of States of the United States, Provinces and other subdivisions of Canada, States of Mexico, and names of additional countries.



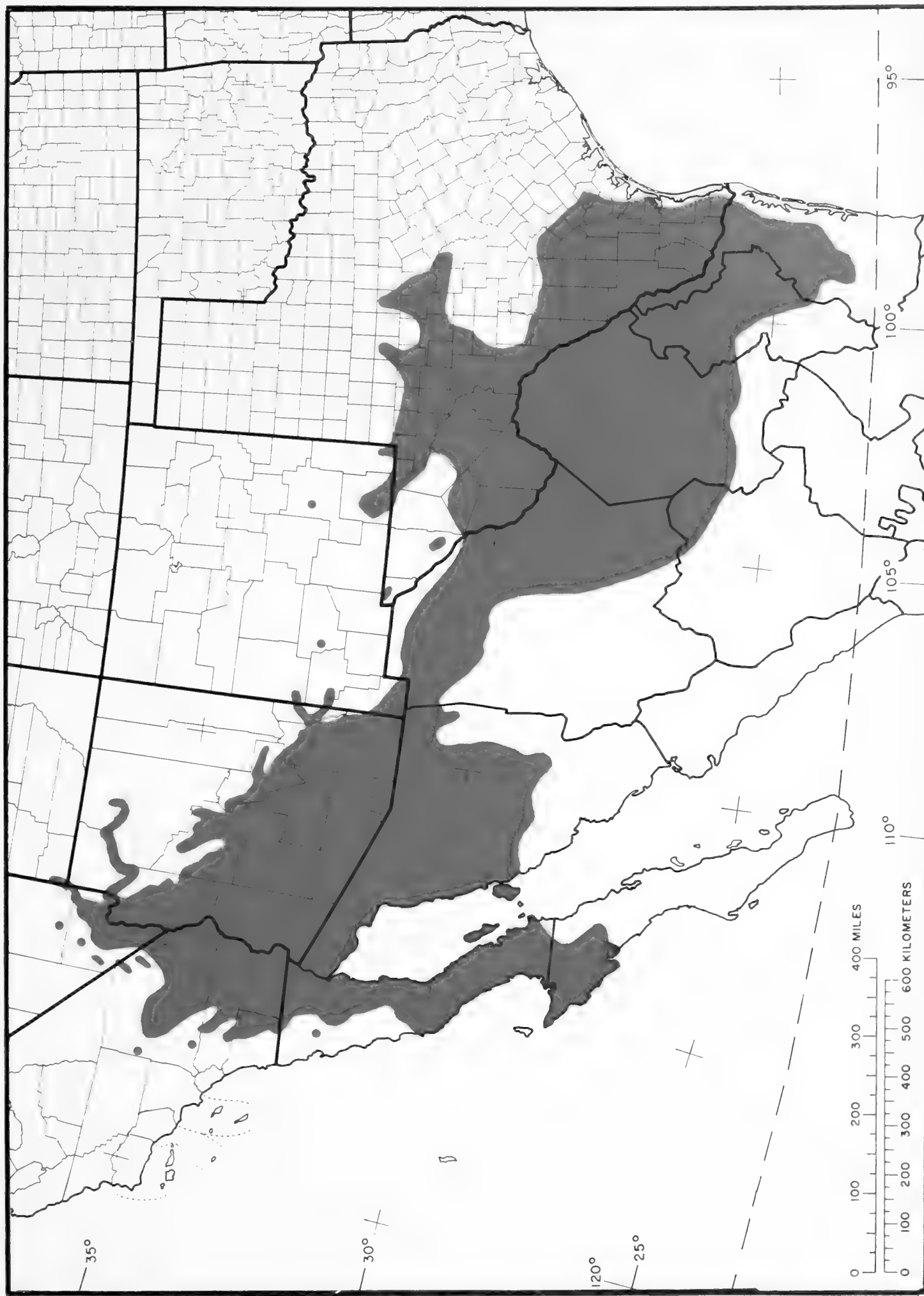
Map 1-N. *Acacia berlandieri* Benth., Berlandier acacia.



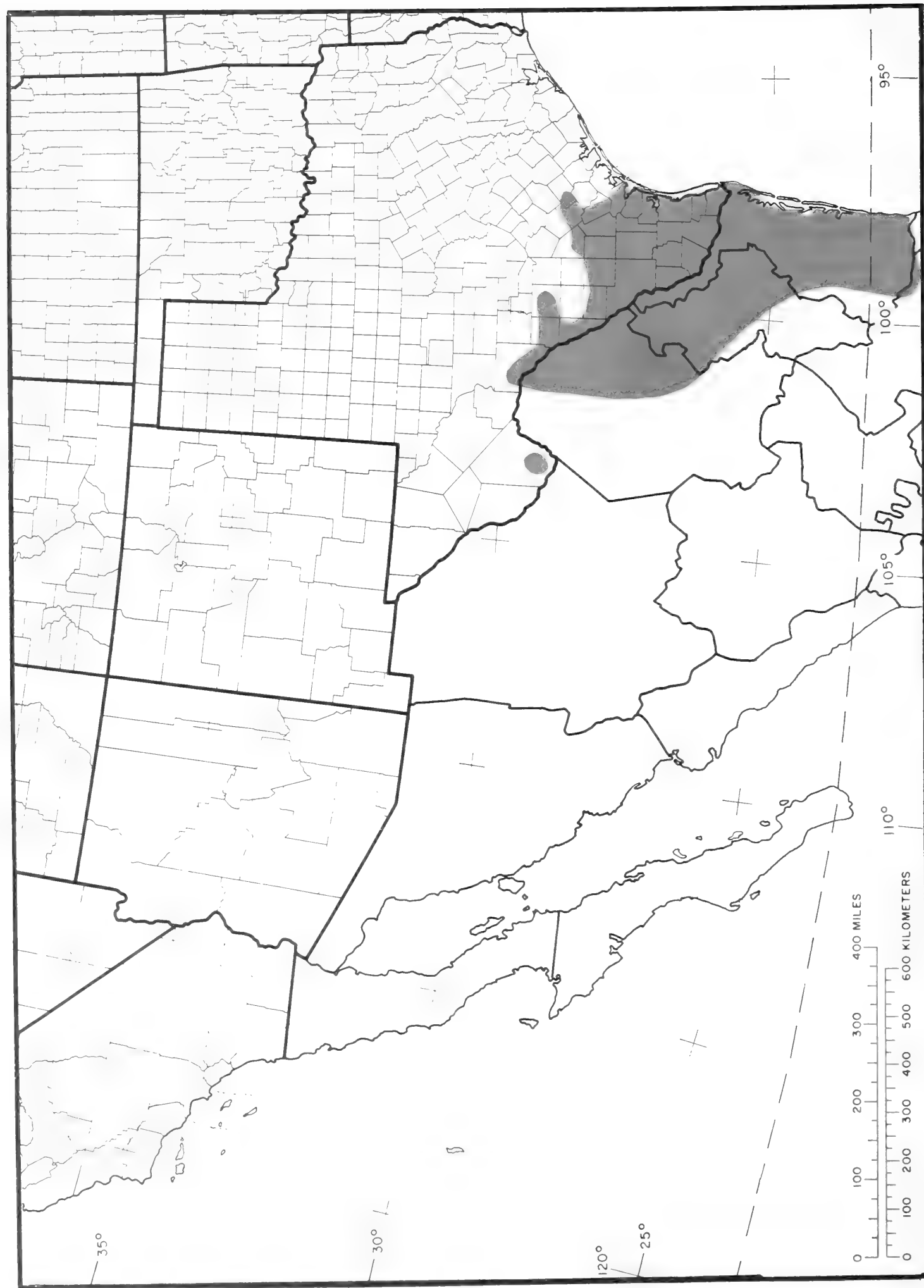
Map 1-SW. *Acacia berlandieri* Benth., Berlandier acacia. Texas and northeastern Mexico.



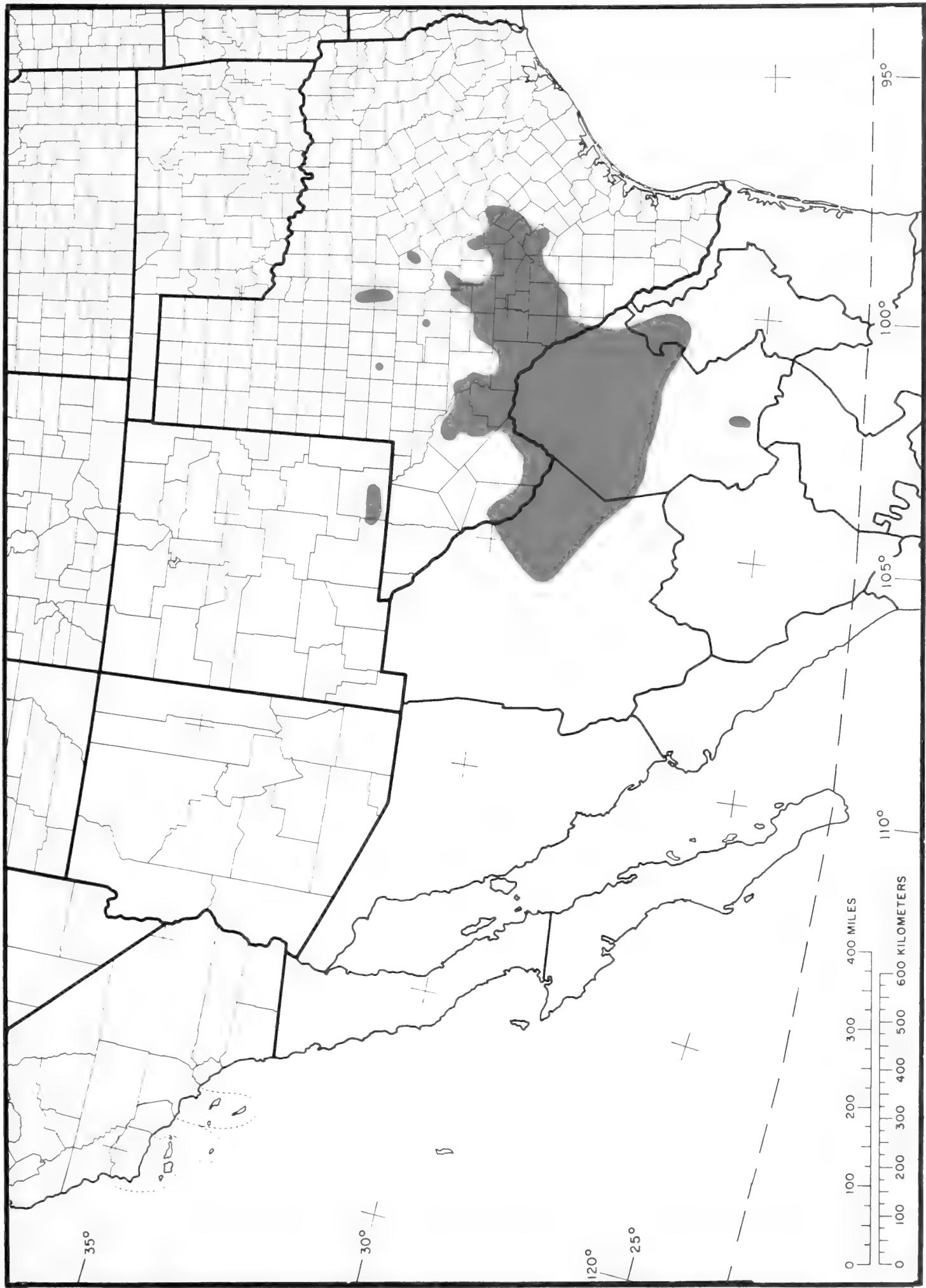
Map 2. *Acacia farnesiana* (L.) Willd., sweet acacia. Widely distributed in tropical America (not mapped), also cultivated and native range in Texas perhaps less than shown.



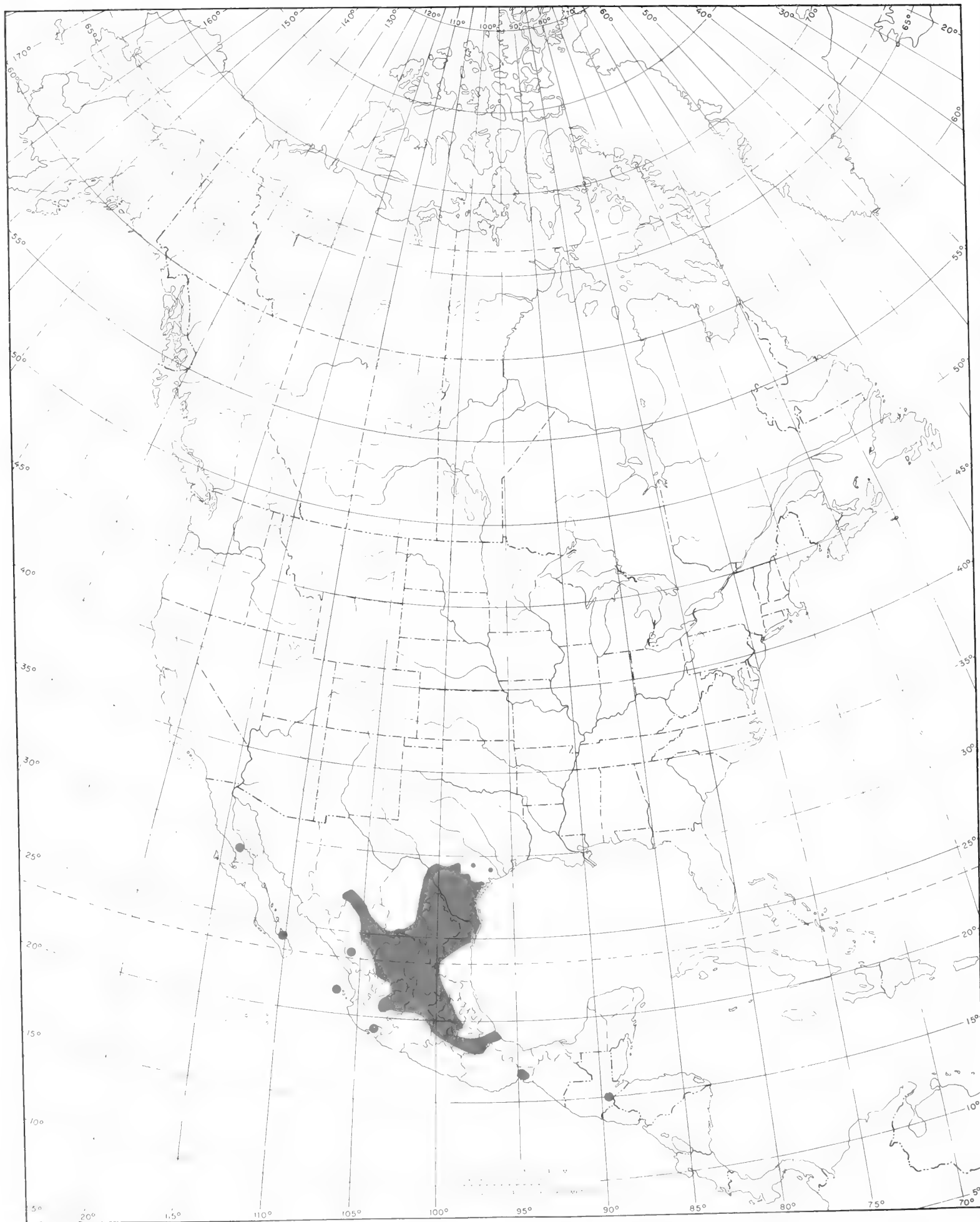
Map 3. *Acacia greggii* A. Gray, catclaw acacia.



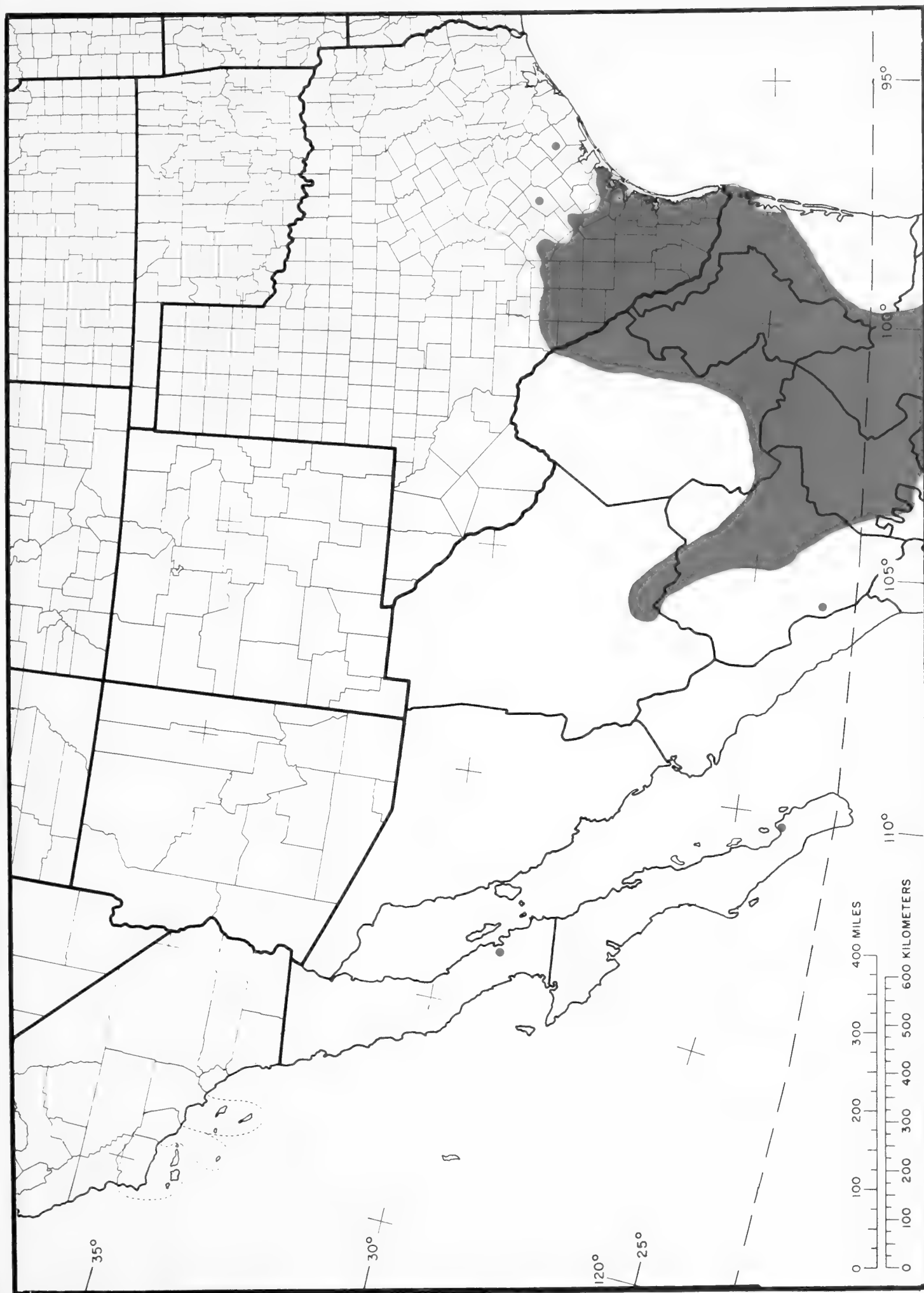
Map 4. *Acacia rigidula* Benth., blackbrush acacia. Texas and northeastern Mexico.



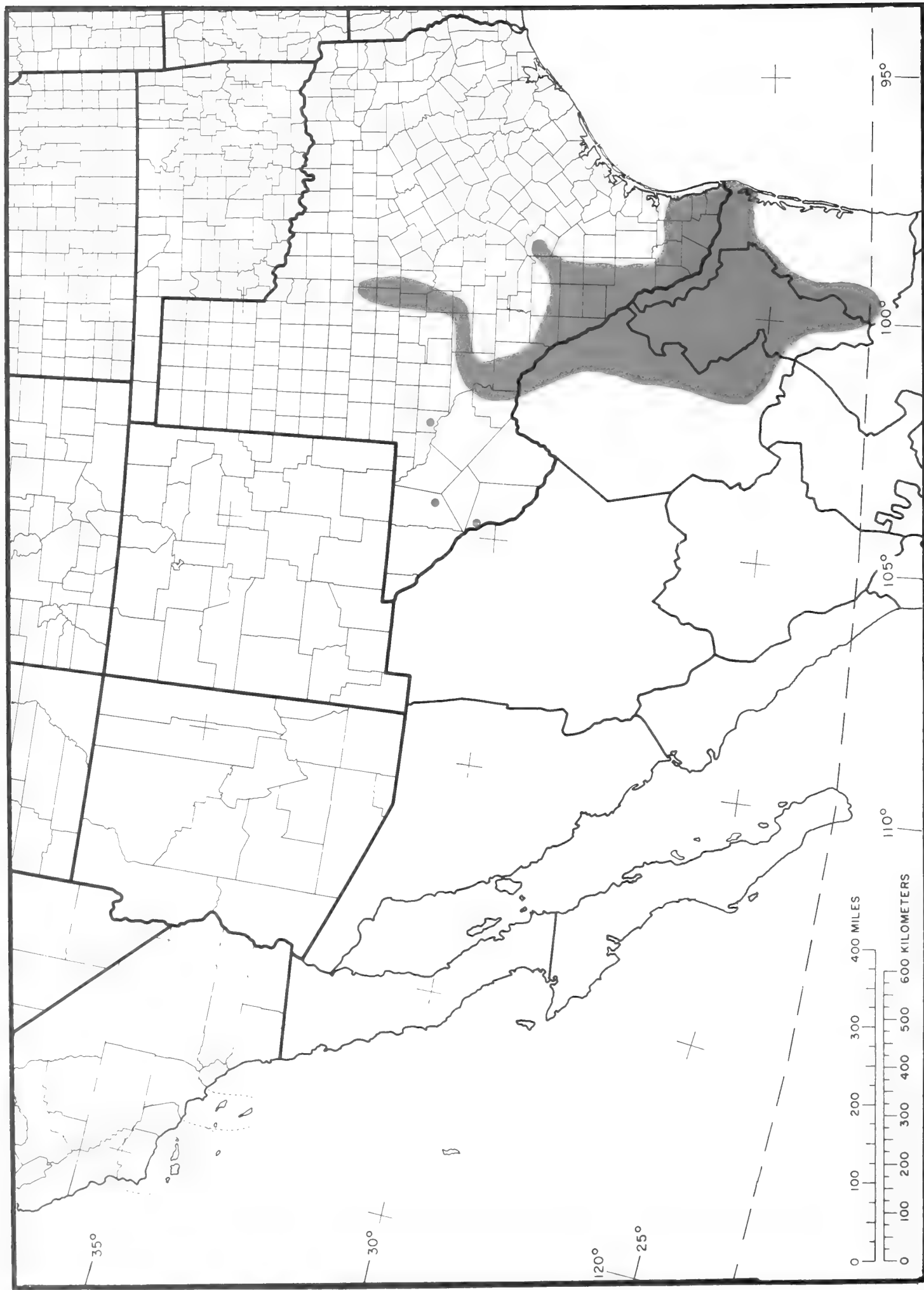
Map 5. *Acacia roemeriana* Scheele, Roemer acacia. Texas, southeastern New Mexico, and northeastern Mexico.



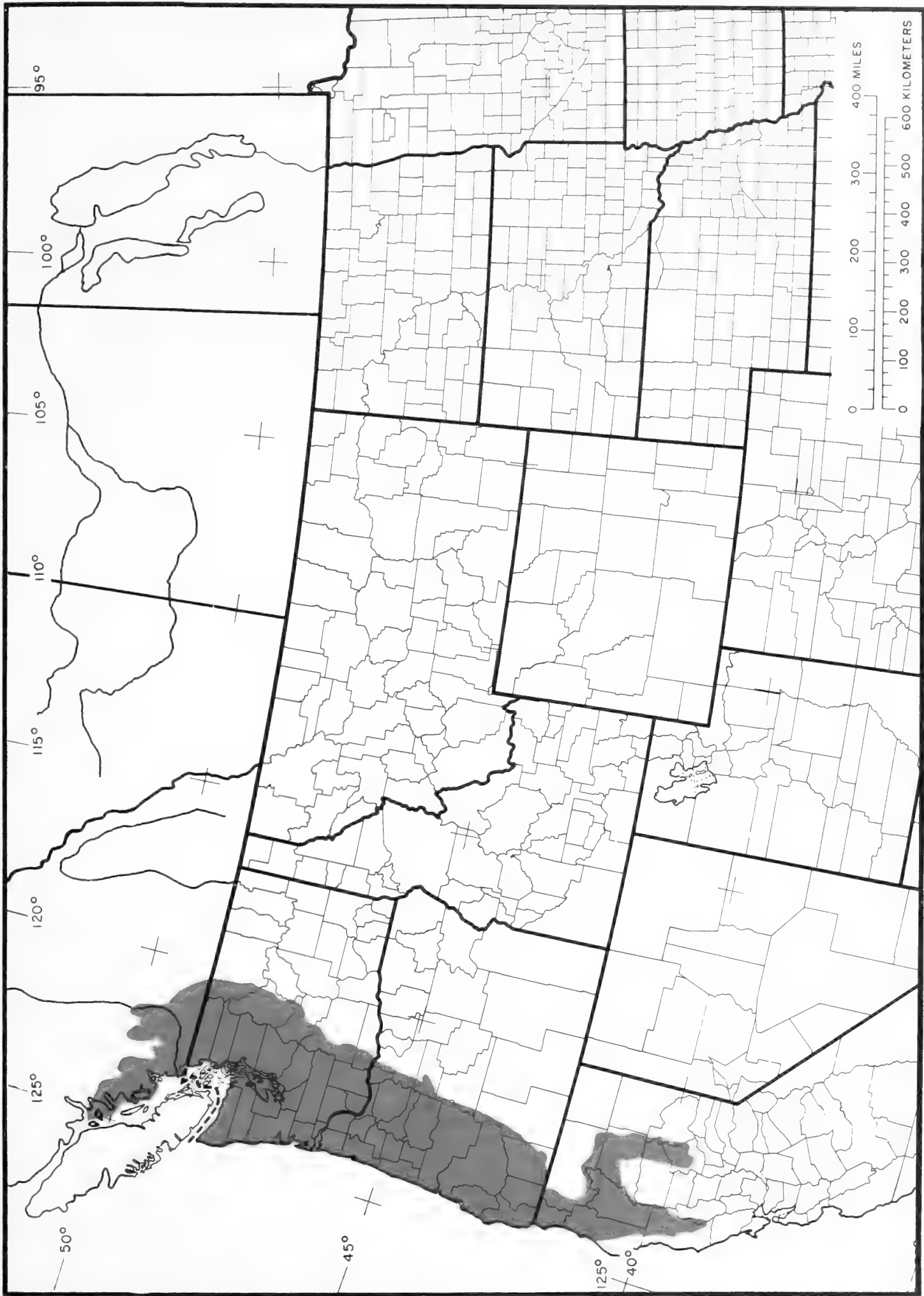
Map 6-N. *Acacia tortuosa* (L.) Willd., twisted acacia. Texas, Mexico, and Guatemala. Also West Indies and northern South America (not mapped).



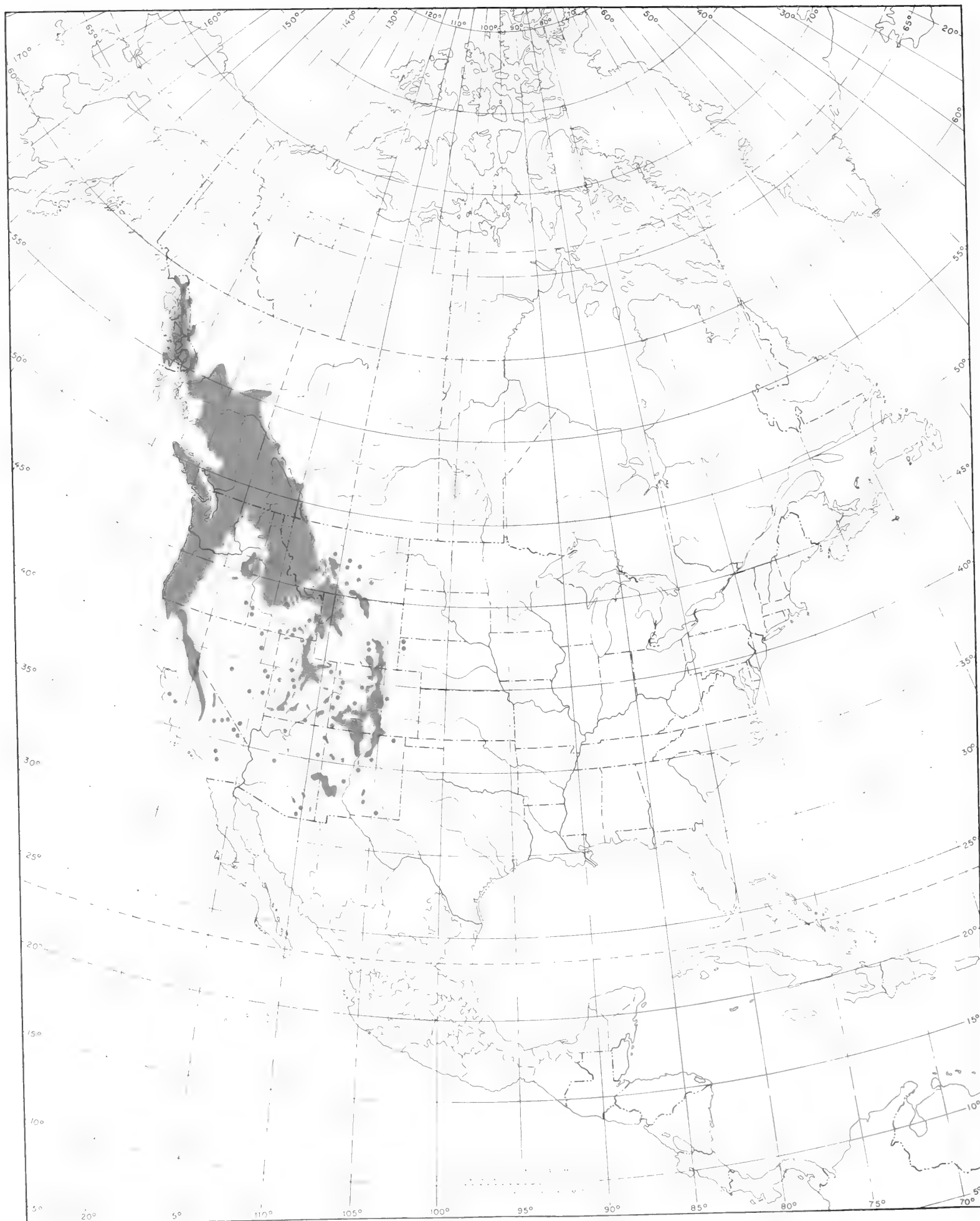
Map 6-SW. *Acacia tortuosa* (L.) Willd., twisted acacia.



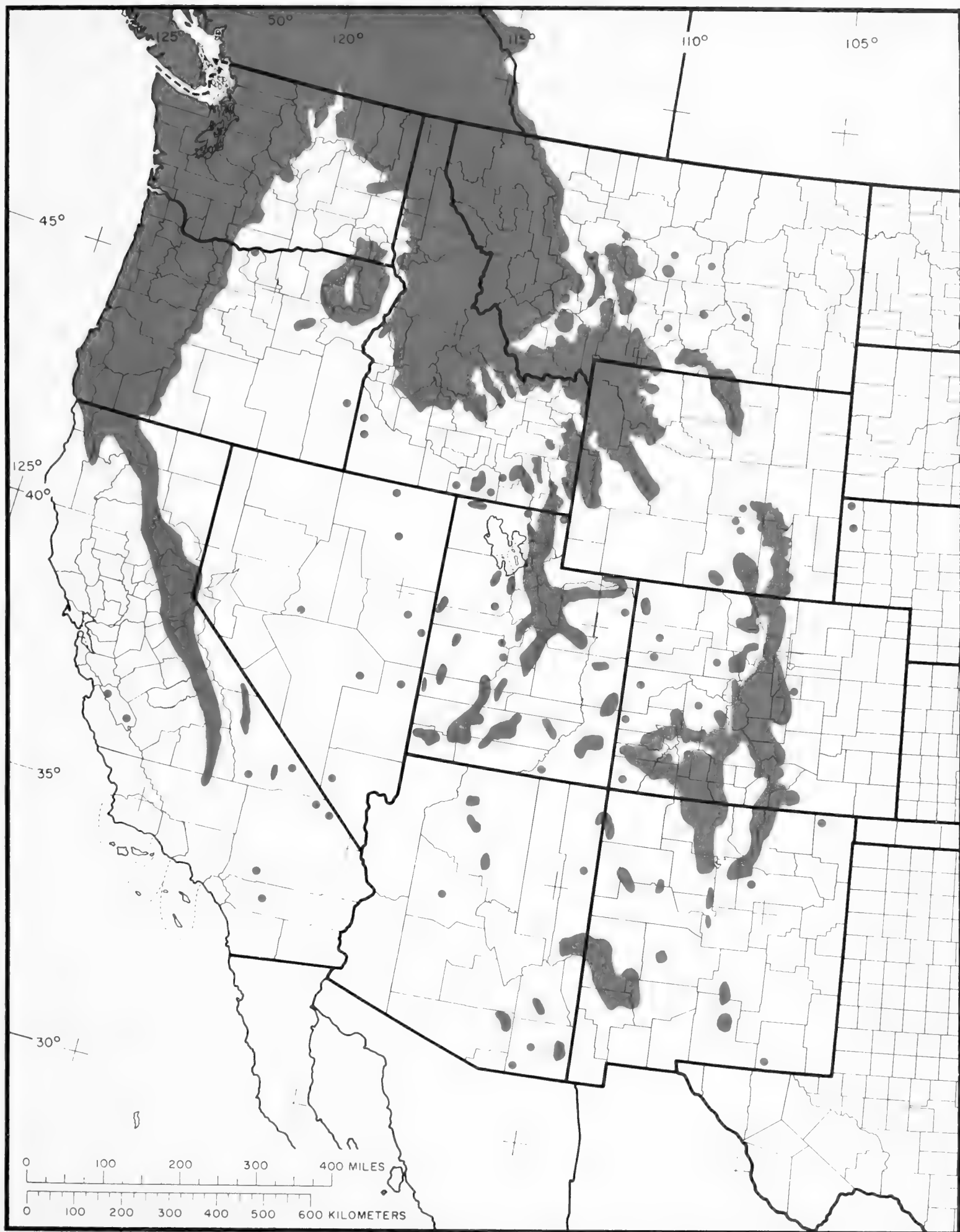
Map 7. *Acacia wrightii* Benth., Wright acacia. Texas and northeastern Mexico.



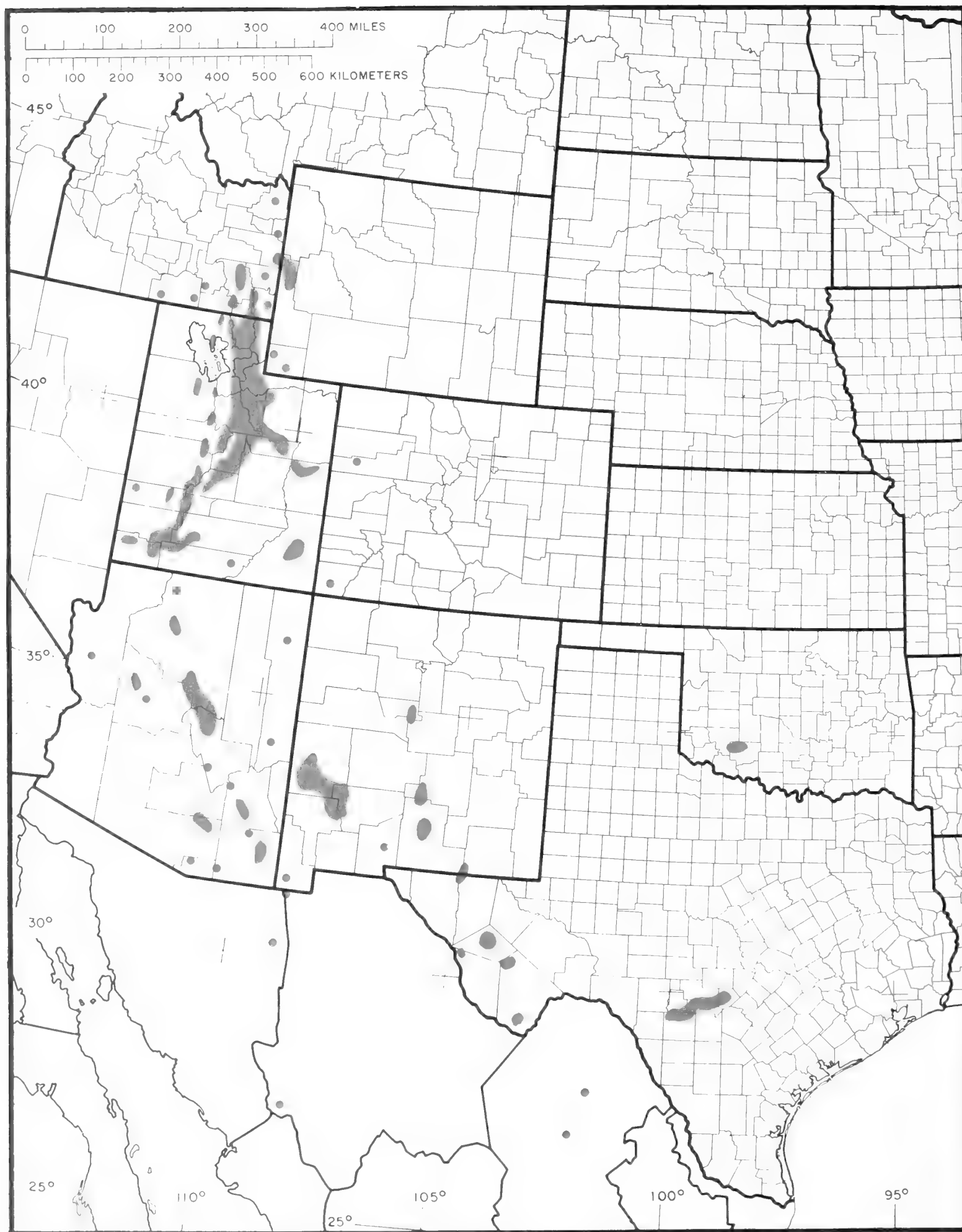
Map 8. *Acer circinatum* Pursh, vine maple.



Map 9-N. *Acer glabrum* Torr., Rocky Mountain maple.



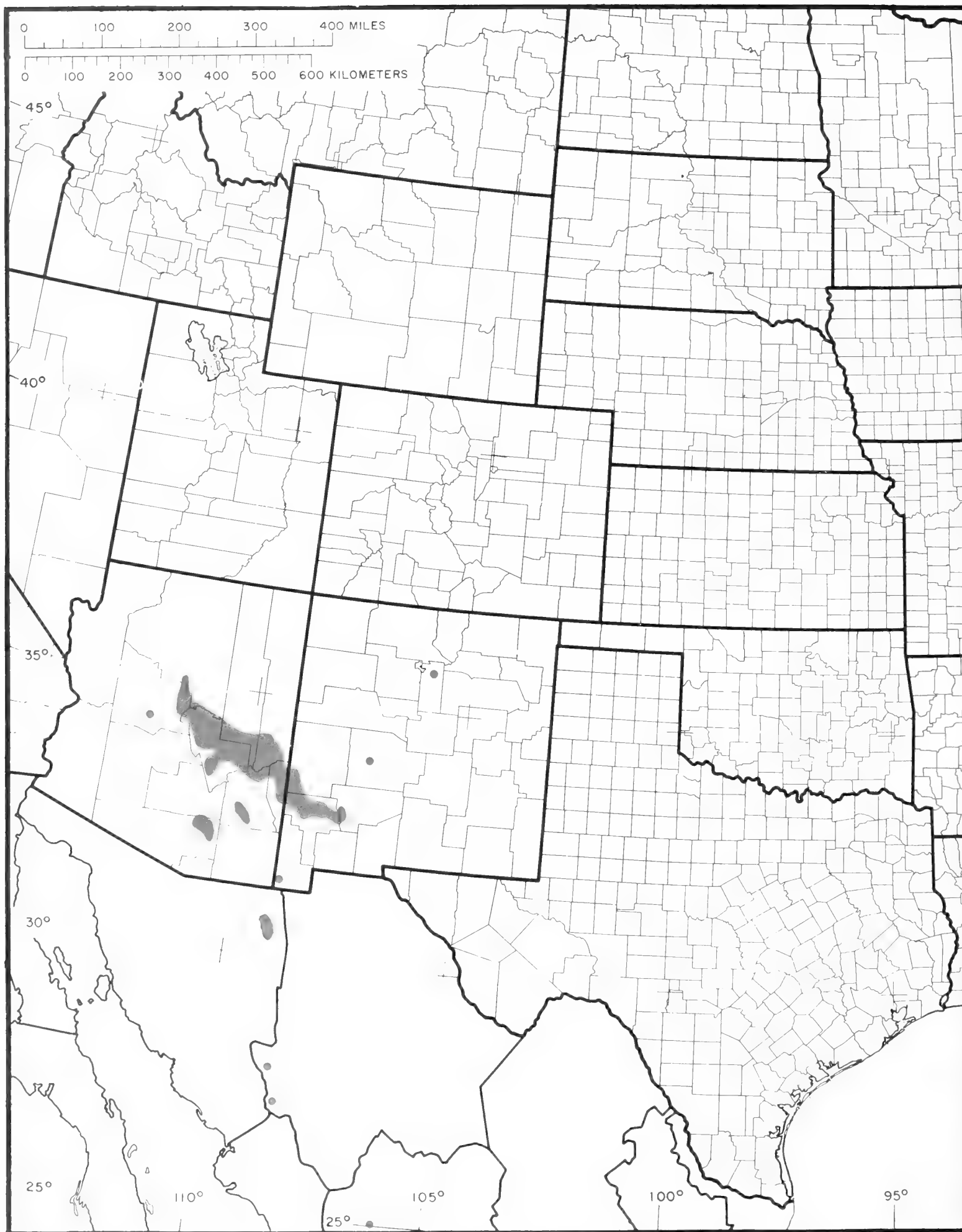
Map 9-W. *Acer glabrum* Torr., Rocky Mountain maple.



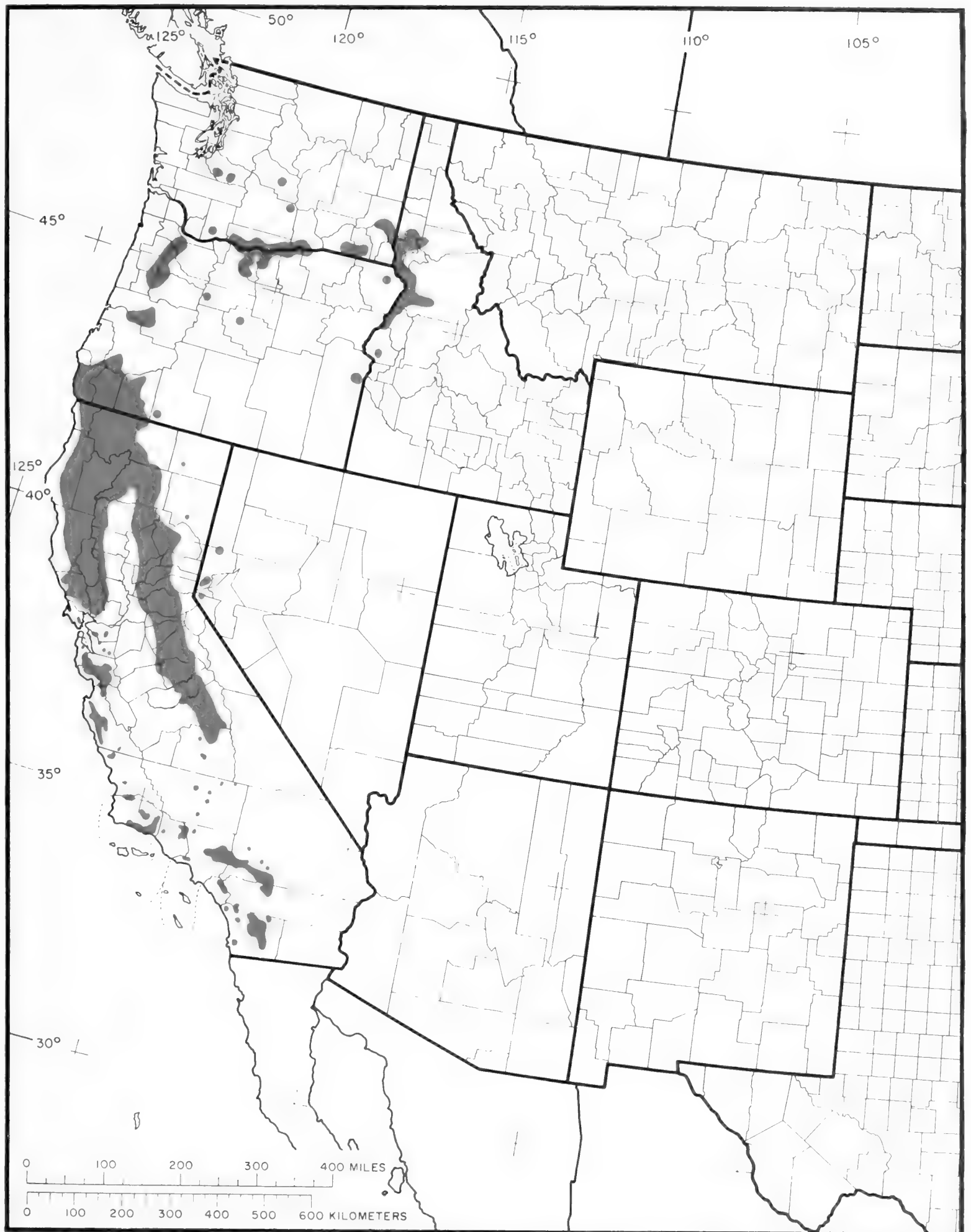
Map 10. *Acer grandidentatum* Nutt., bigtooth maple.



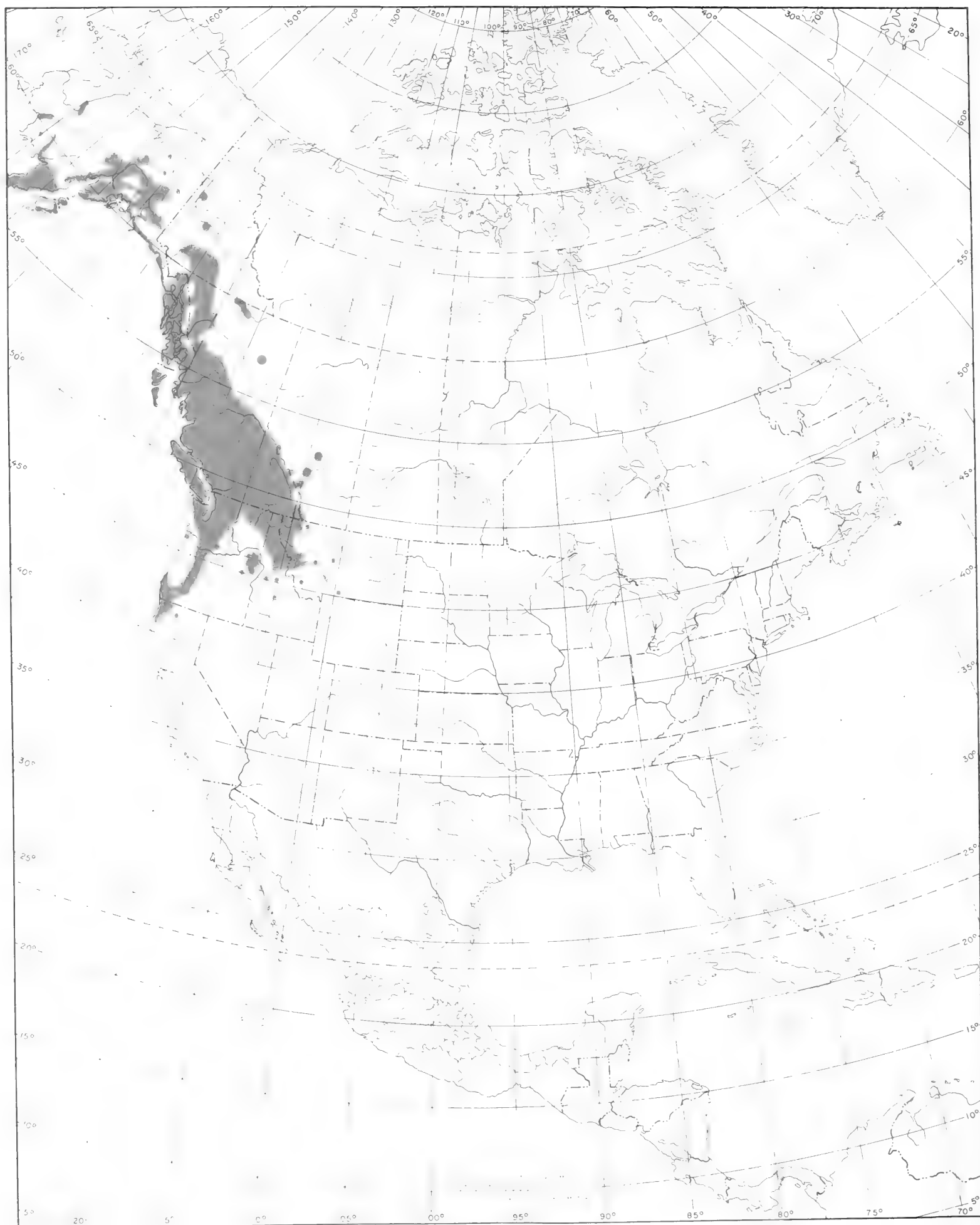
Map 11. *Aesculus californica* (Spach) Nutt., California buckeye. California only.



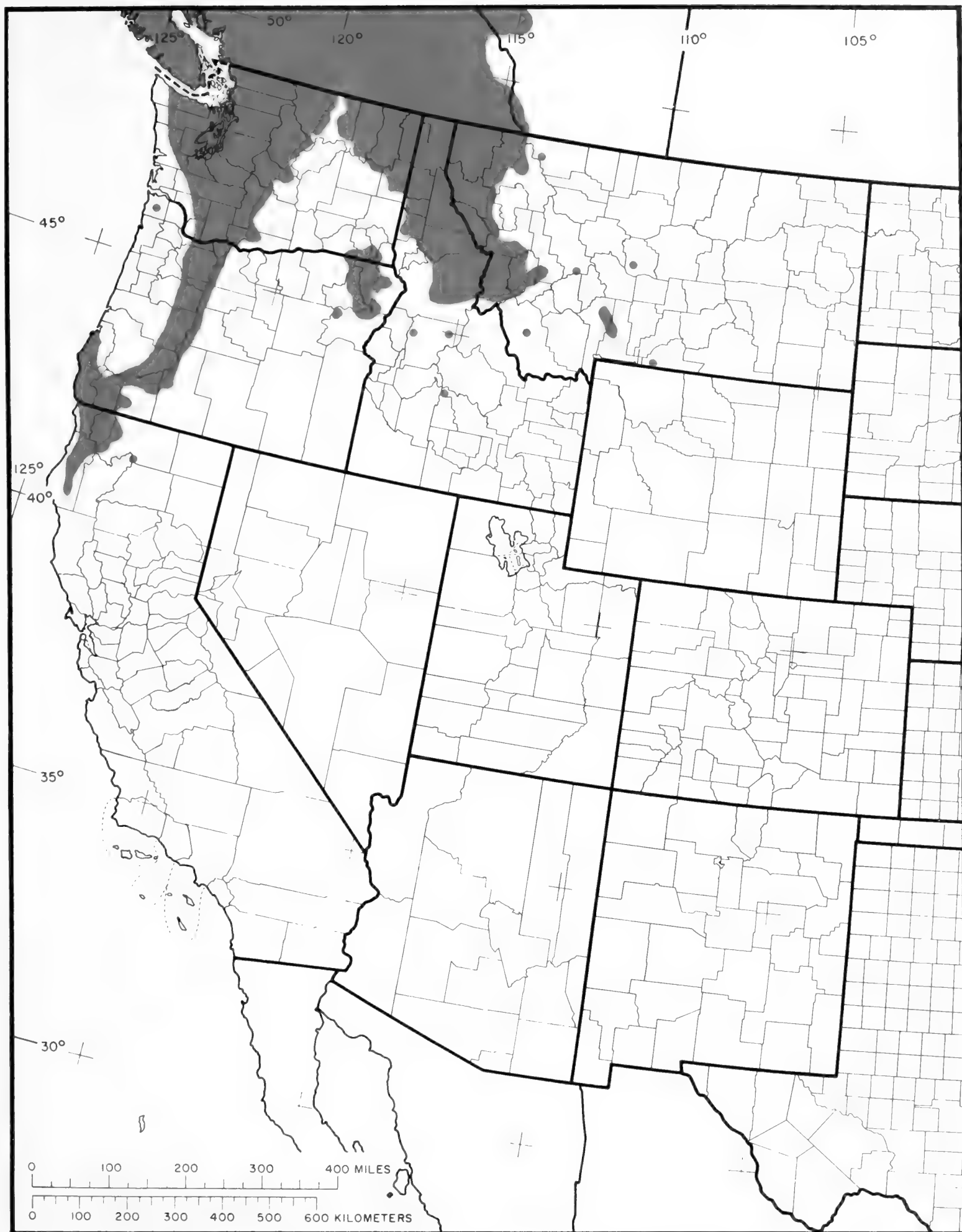
Map 12. *Alnus oblongifolia* Torr., Arizona alder. New Mexico, Arizona, and northwestern Mexico.



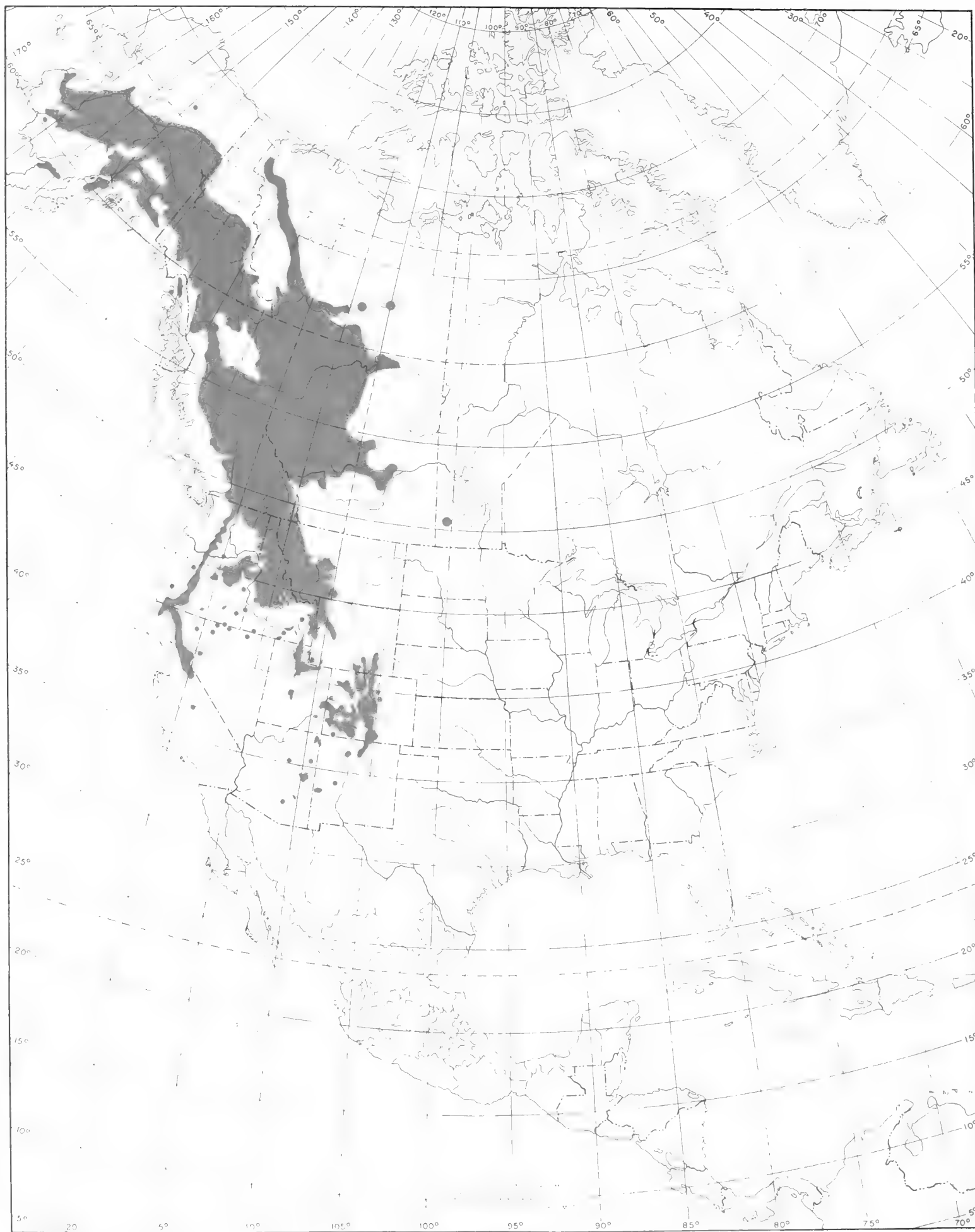
Map 13. *Alnus rhombifolia* Nutt., white alder.



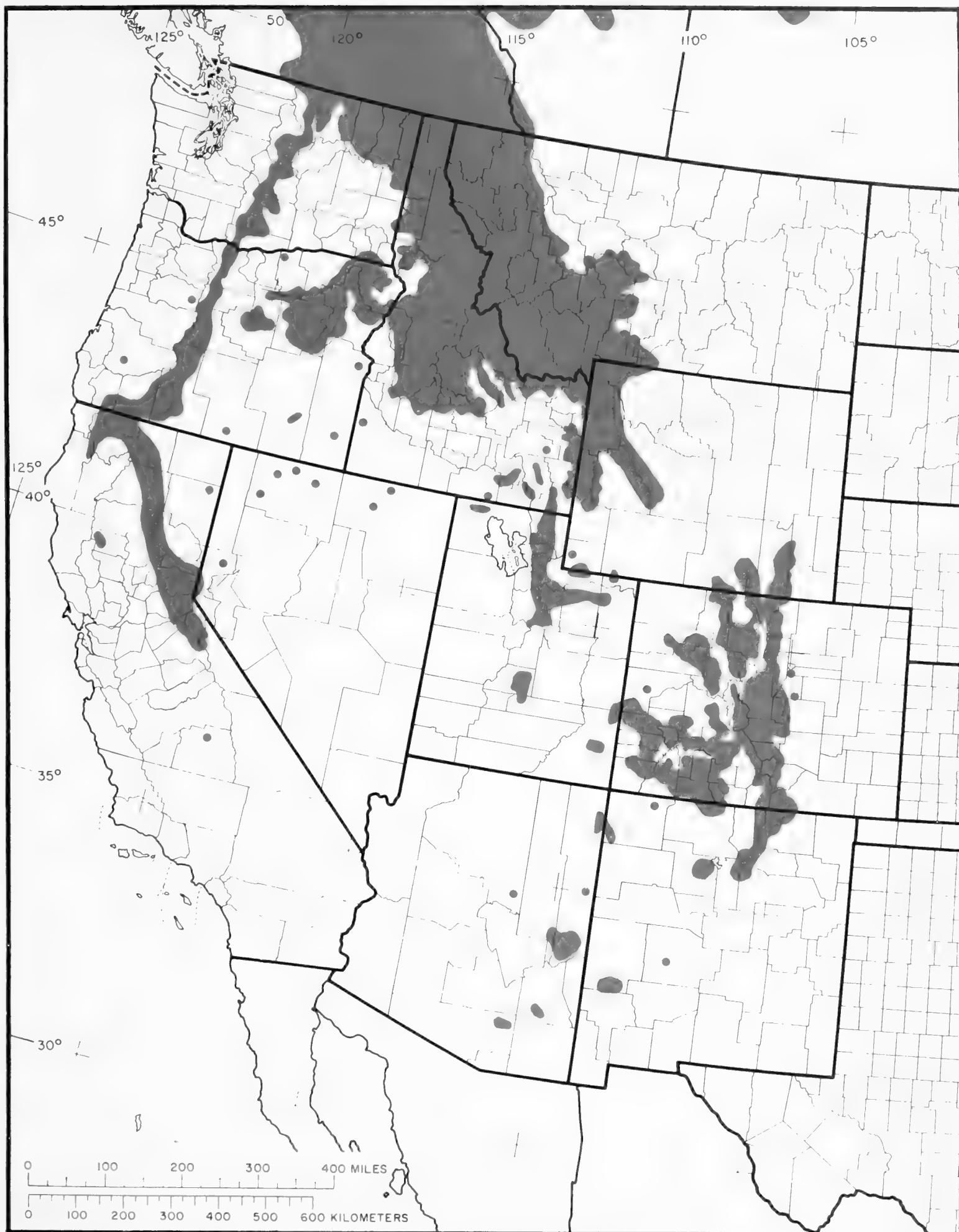
Map 14-N. *Alnus sinuata* (Reg.) Rydb., Sitka alder.



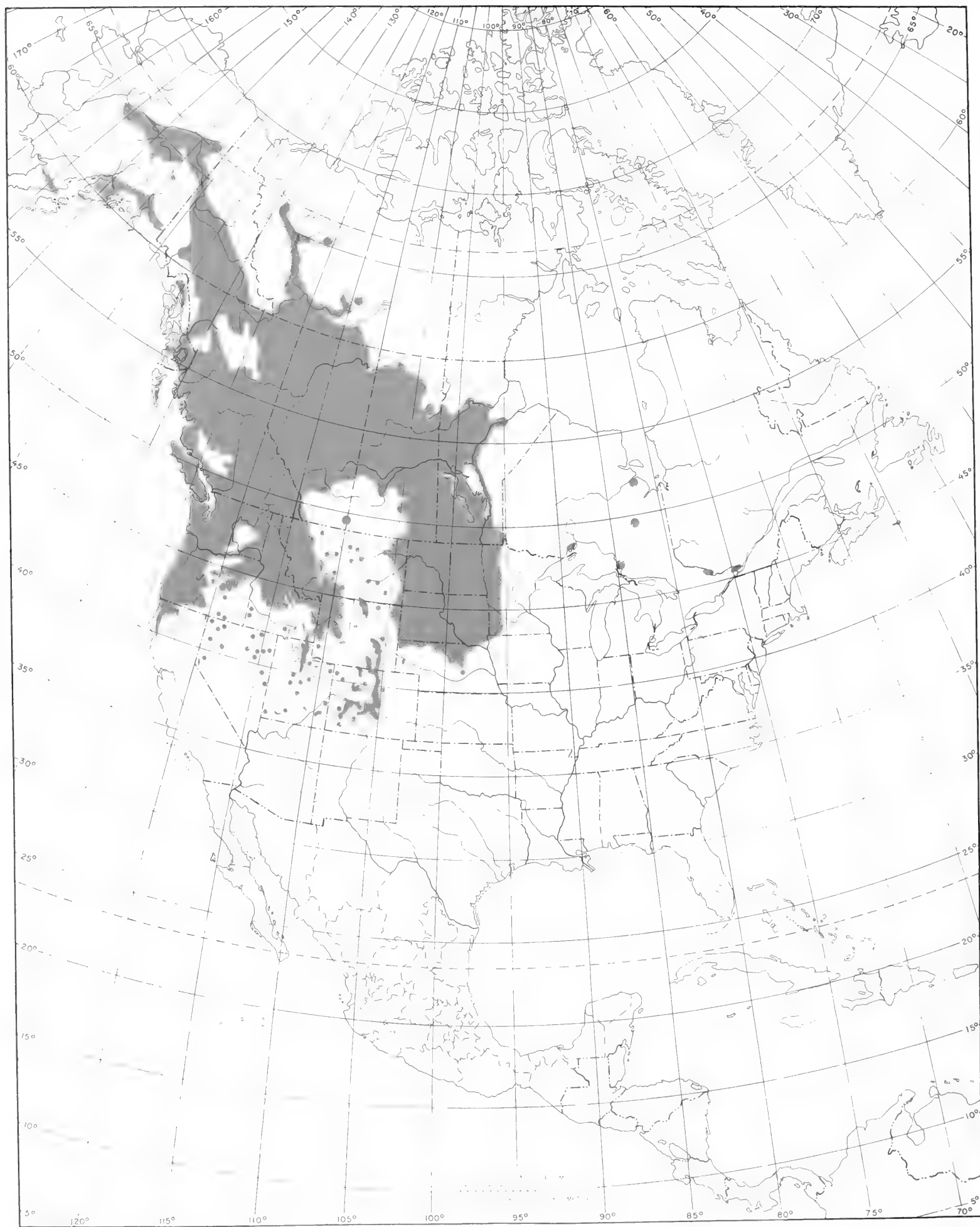
Map 14-W. *Alnus sinuata* (Reg.) Rydb., Sitka alder.



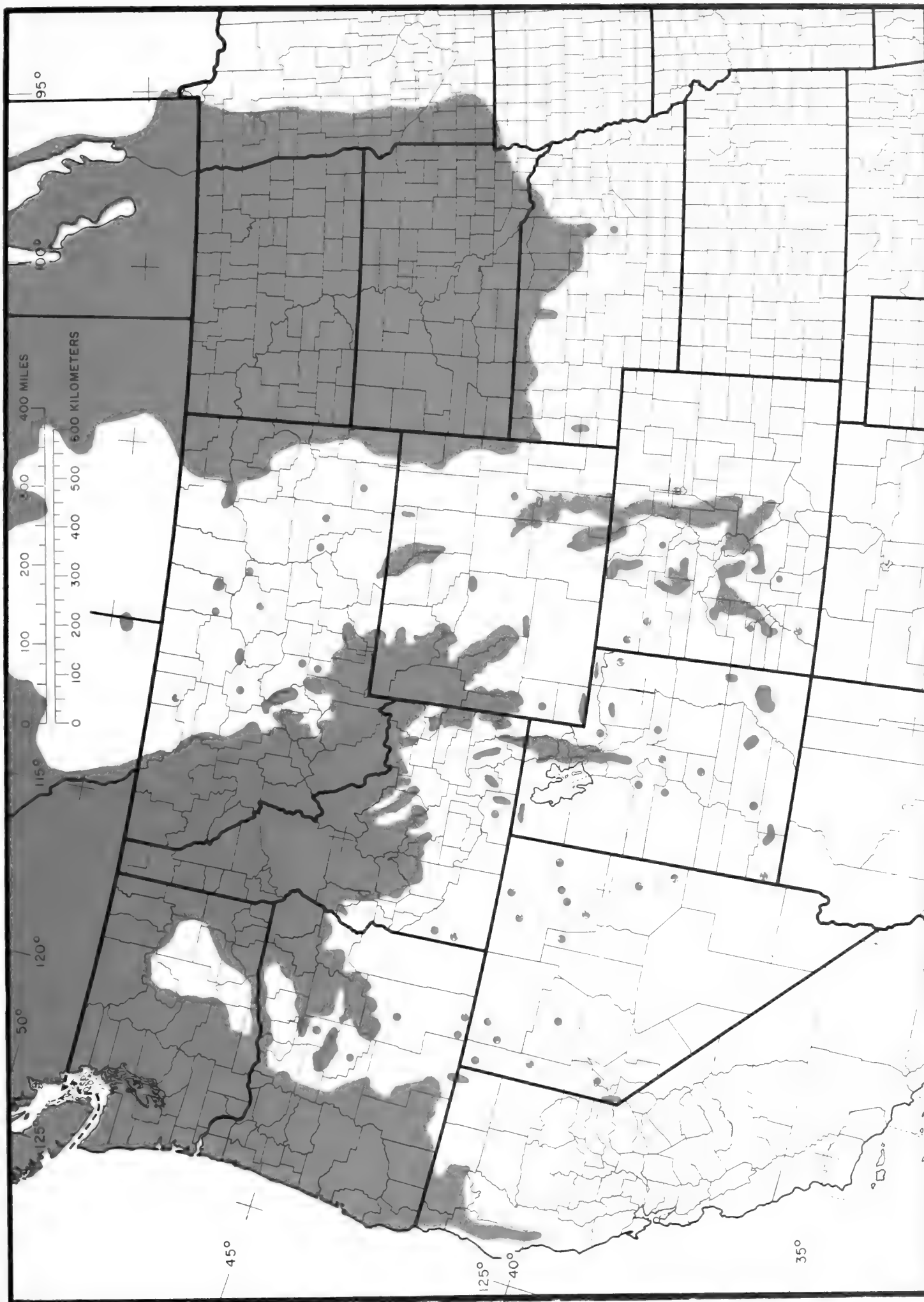
Map 15-N. *Alnus tenuifolia* Nutt., thinleaf alder.



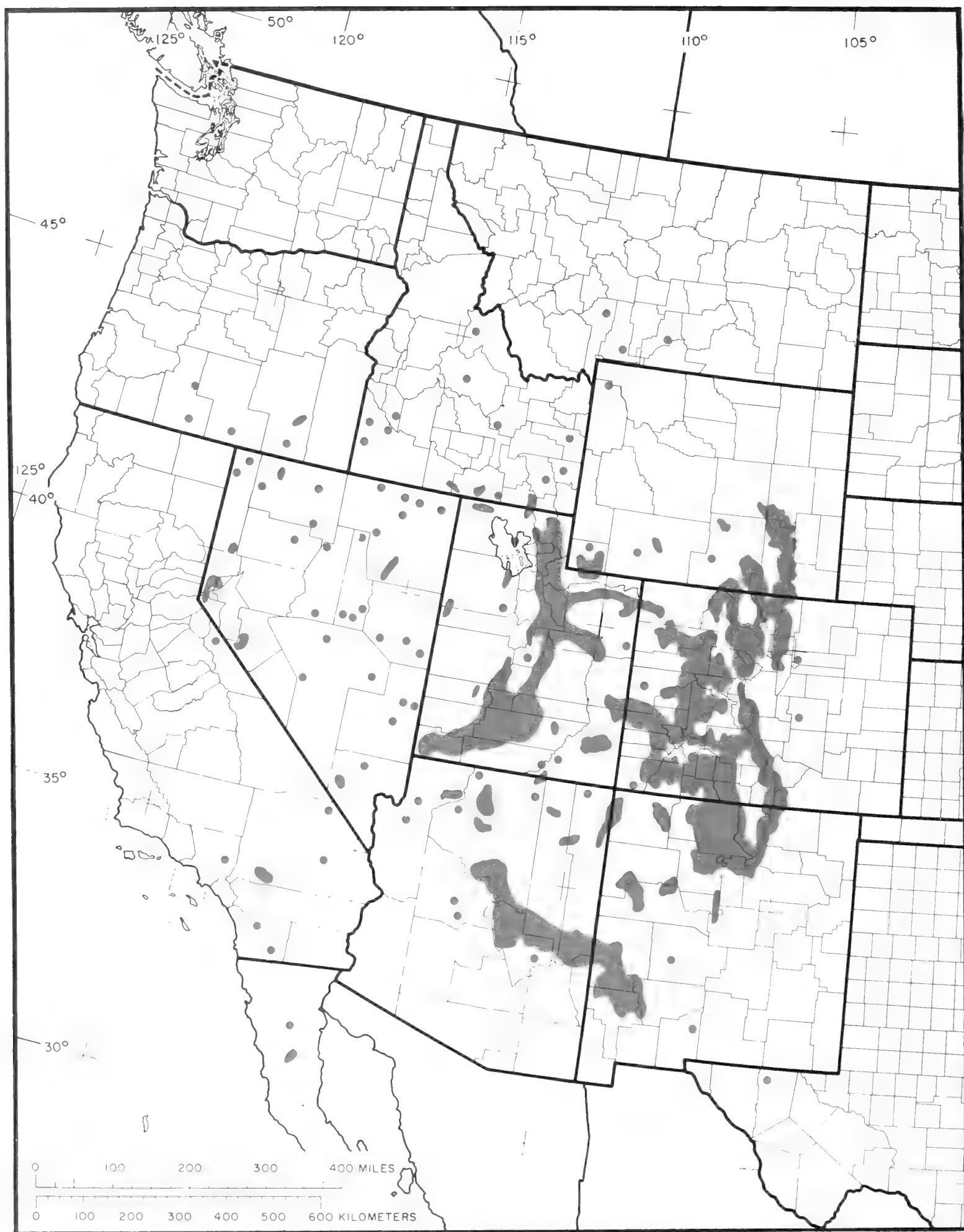
Map 15-W. *Alnus tenuifolia* Nutt., thinleaf alder.



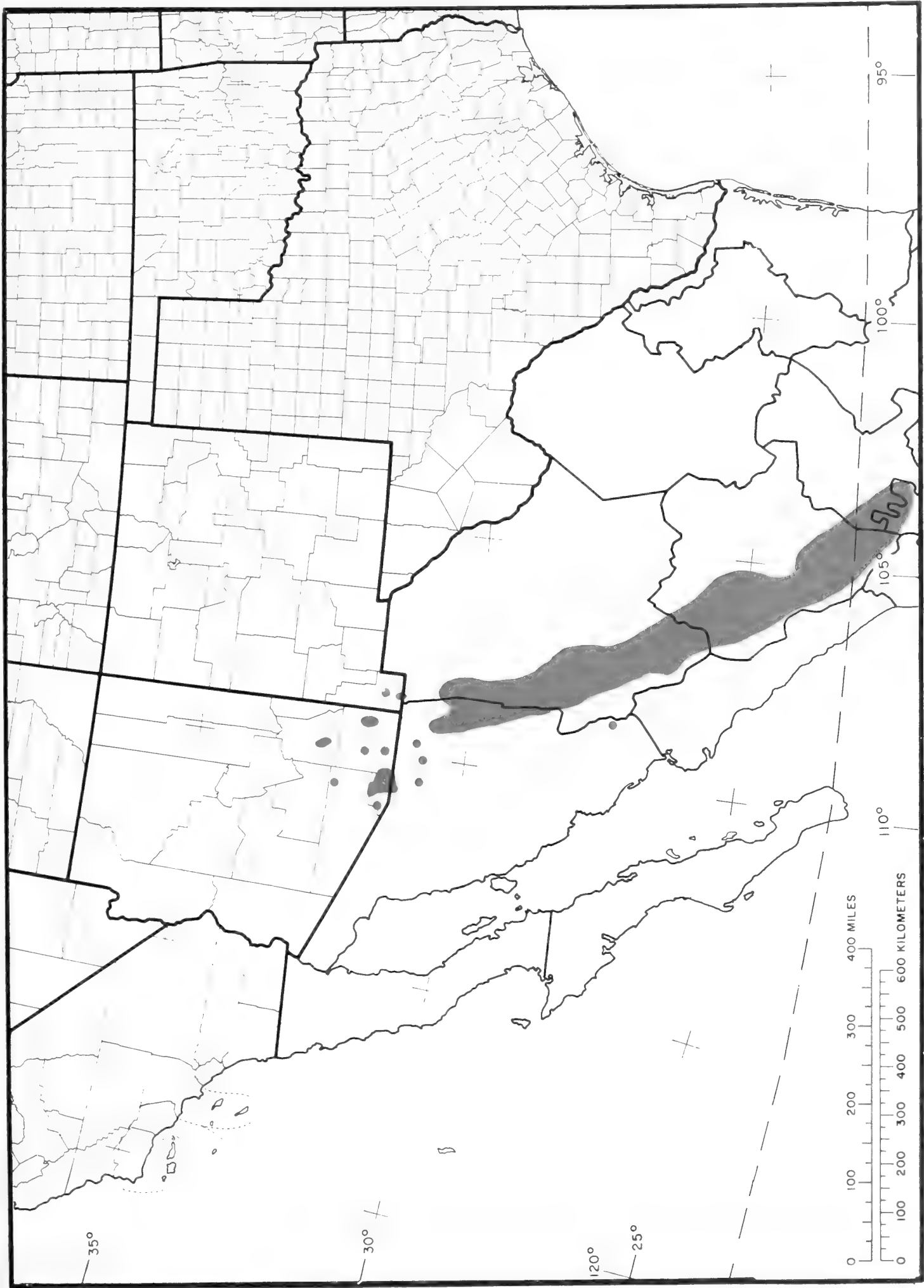
Map 16-N. *Amelanchier alnifolia* (Nutt.) Nutt., western serviceberry.



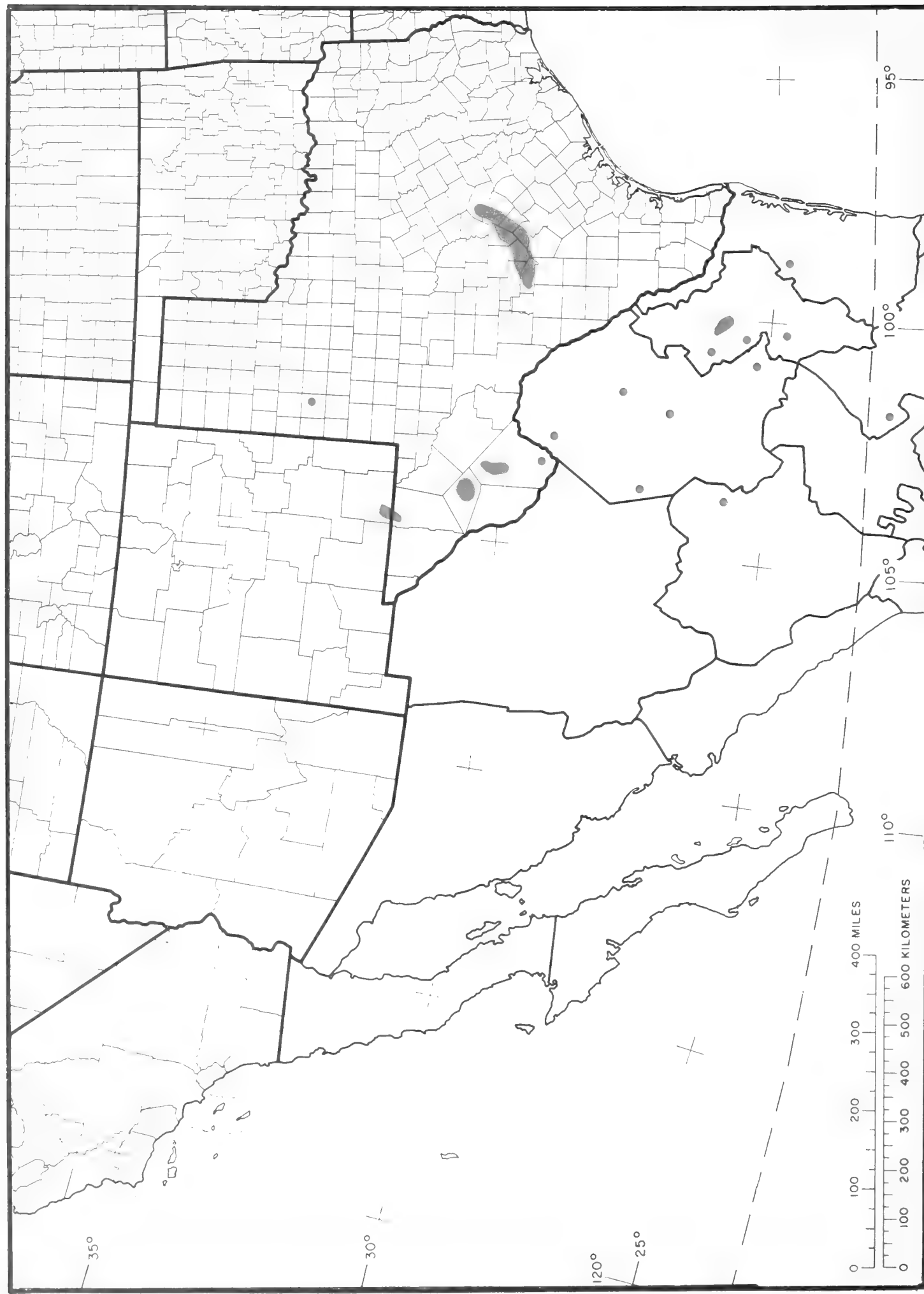
Map 16-NW. *Amelanchier alnifolia* (Nutt.) Nutt., western serviceberry.



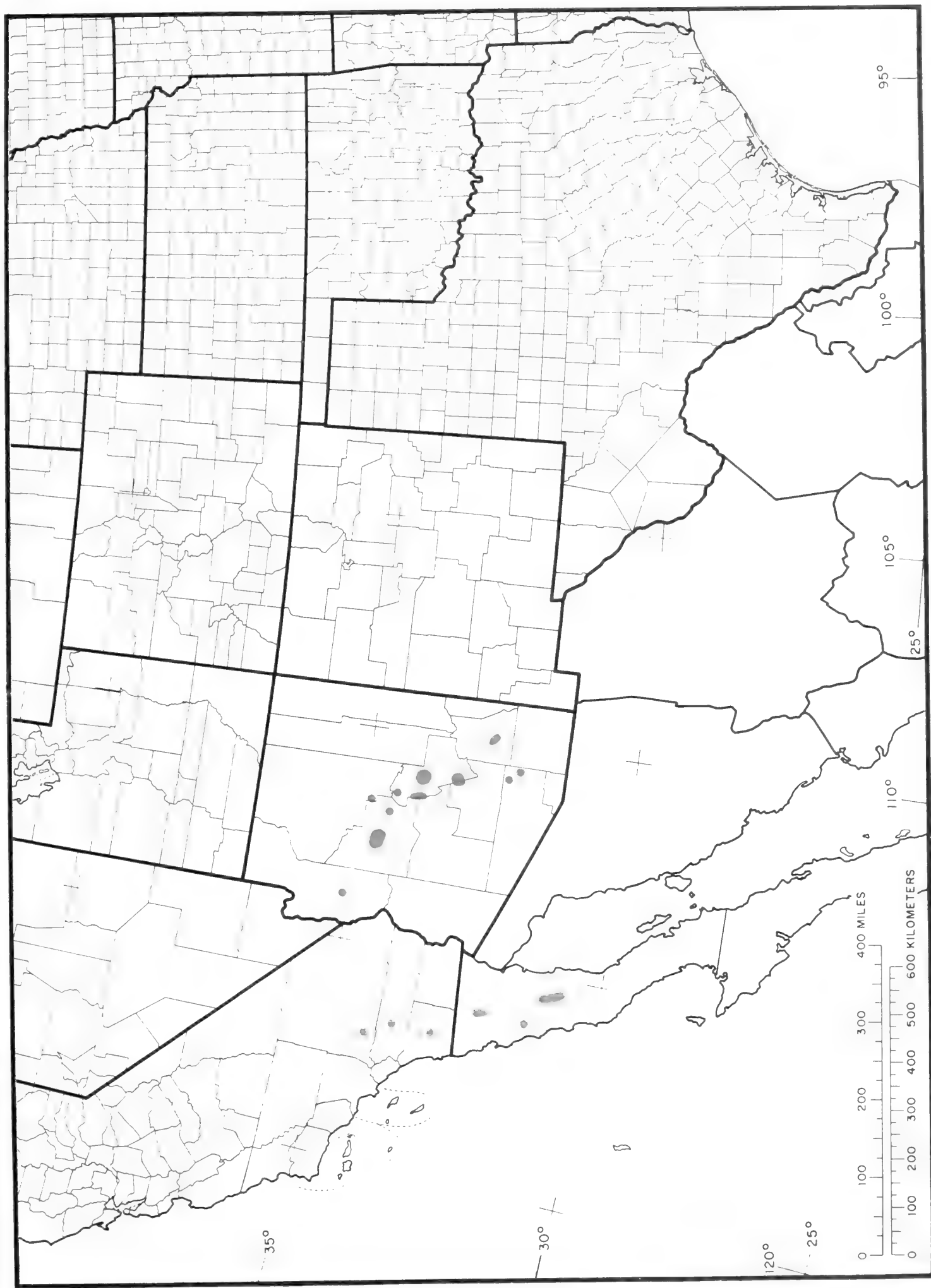
Map 17. *Amelanchier utahensis* Koehne. Utah serviceberry.



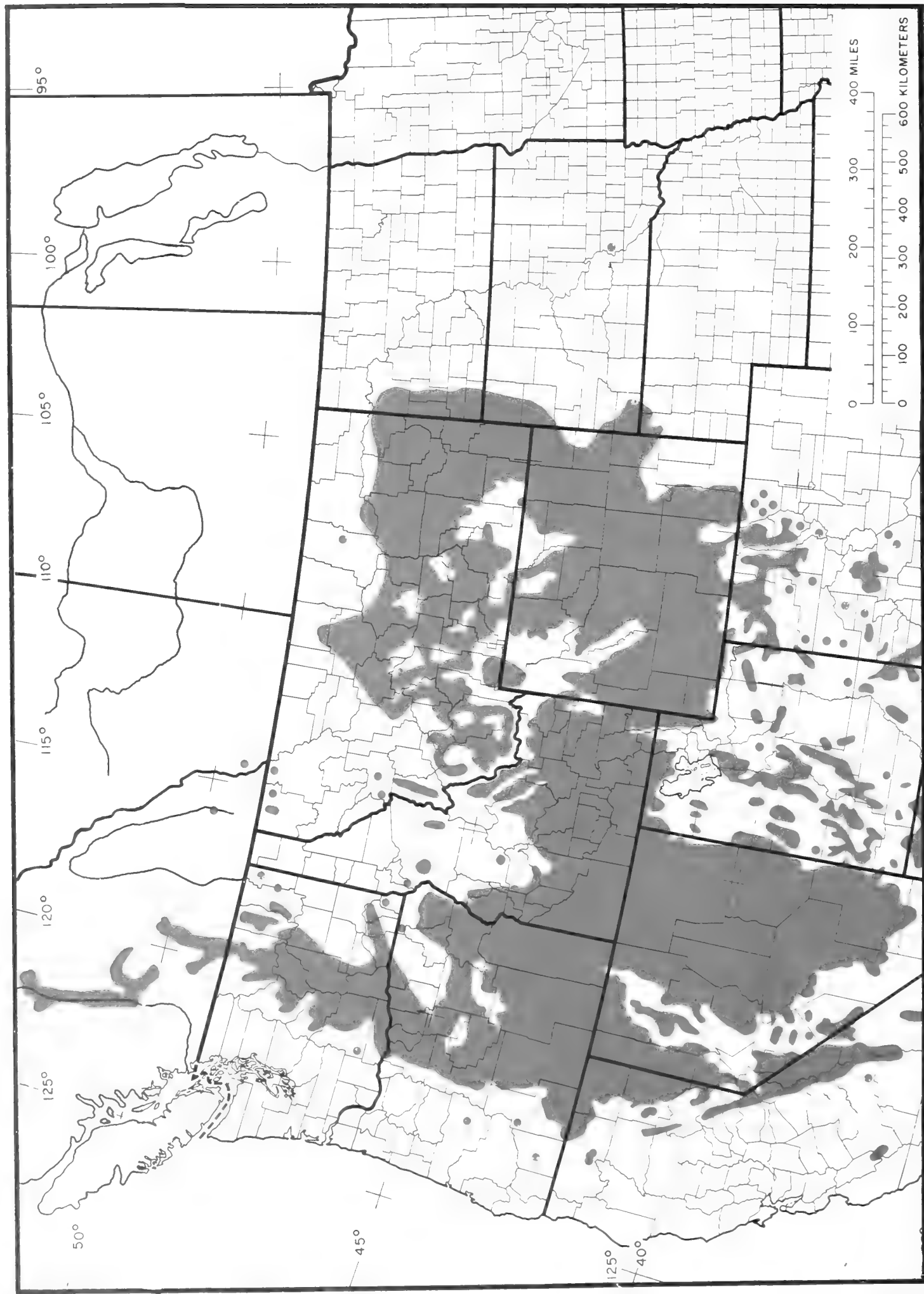
Map 18. *Arbutus arizonica* (A. Gray) Sarg., Arizona madrone. Southeastern Arizona, extreme southwestern New Mexico, and northwestern Mexico.



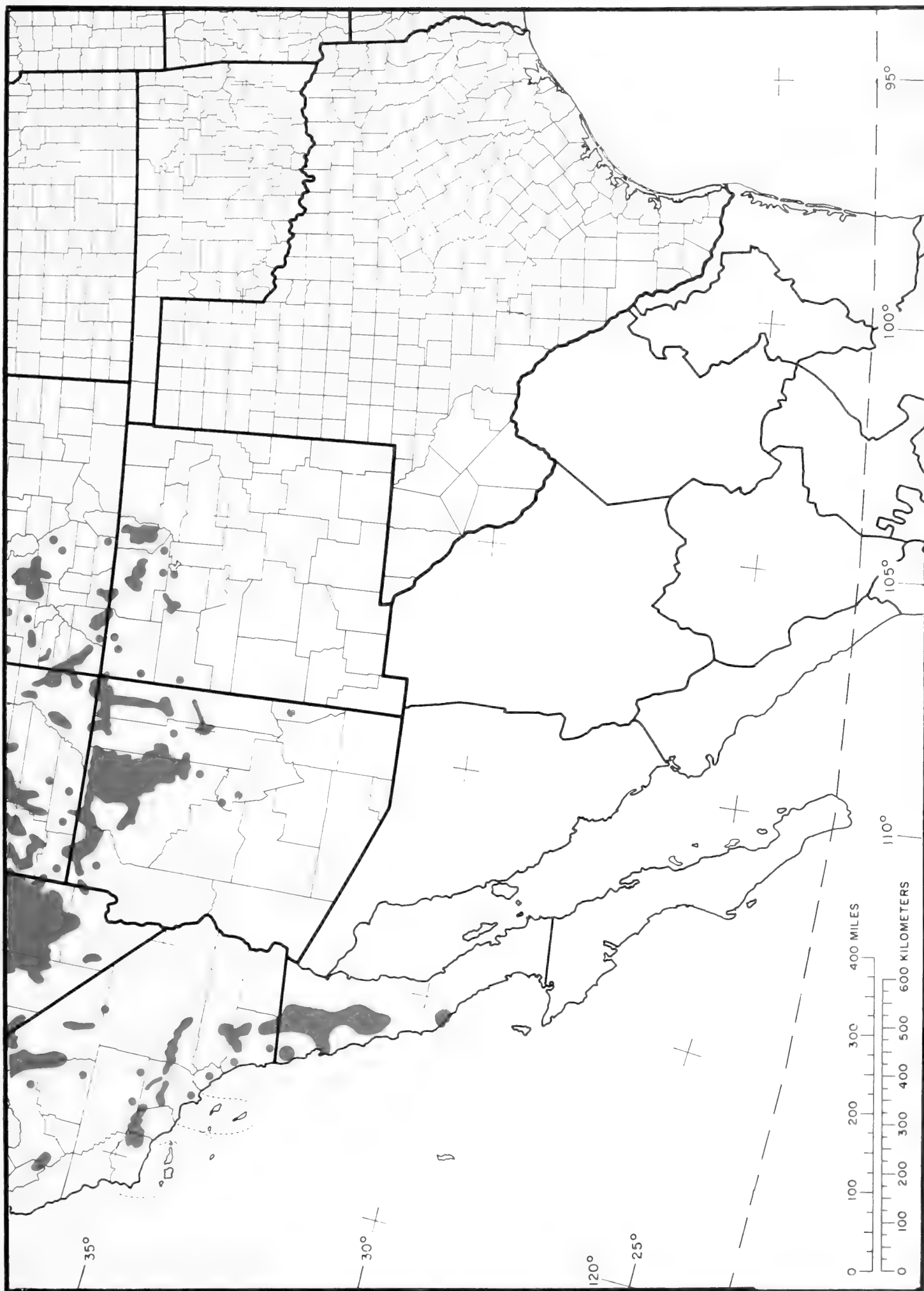
Map 19. *Arbutus texana* Buckl., Texas madrone. Texas, southeastern New Mexico, and northeastern Mexico.



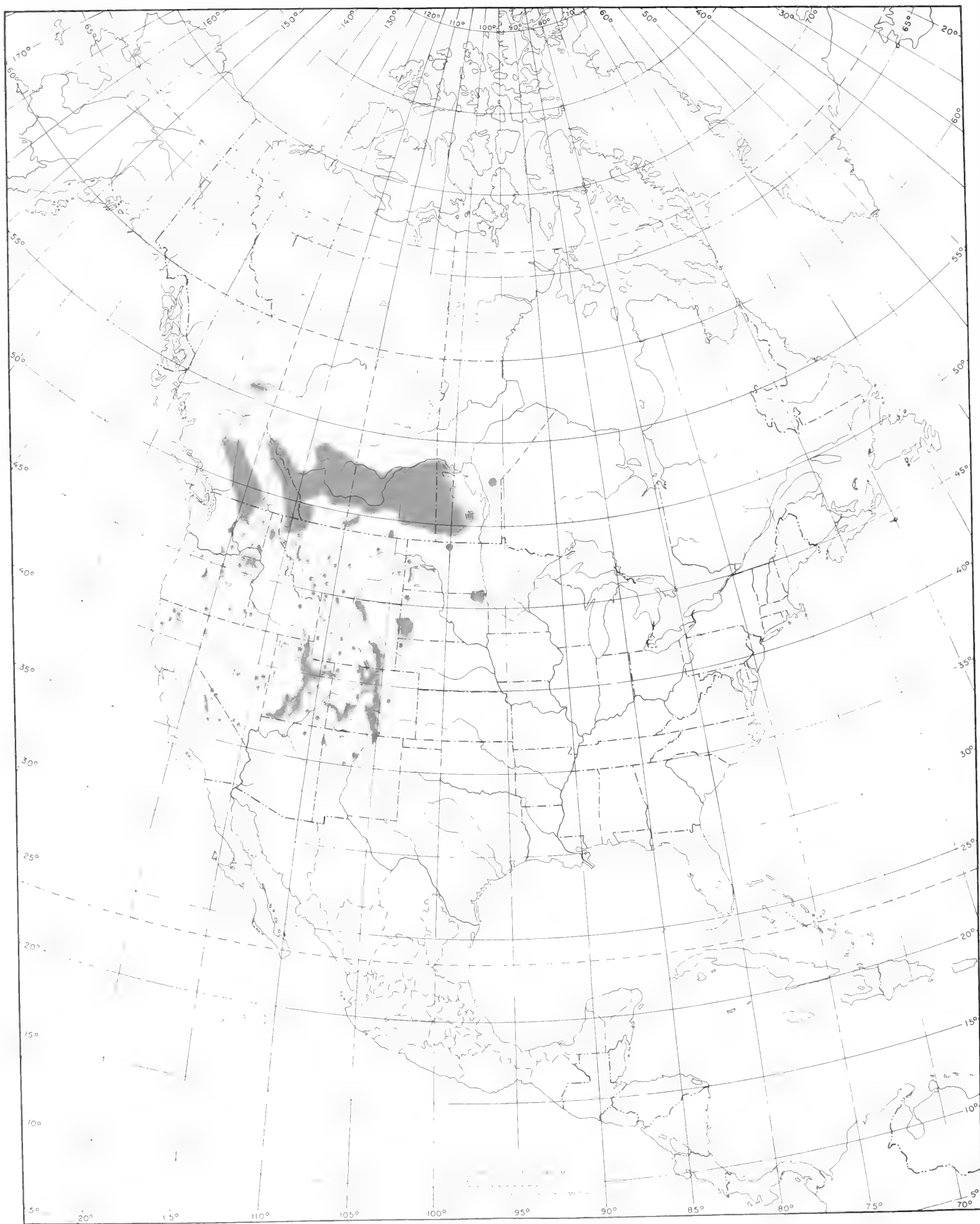
Map 20. *Arctostaphylos pringlei* Parry, Pringle manzanita. Arizona, southern California, and northern Baja California.



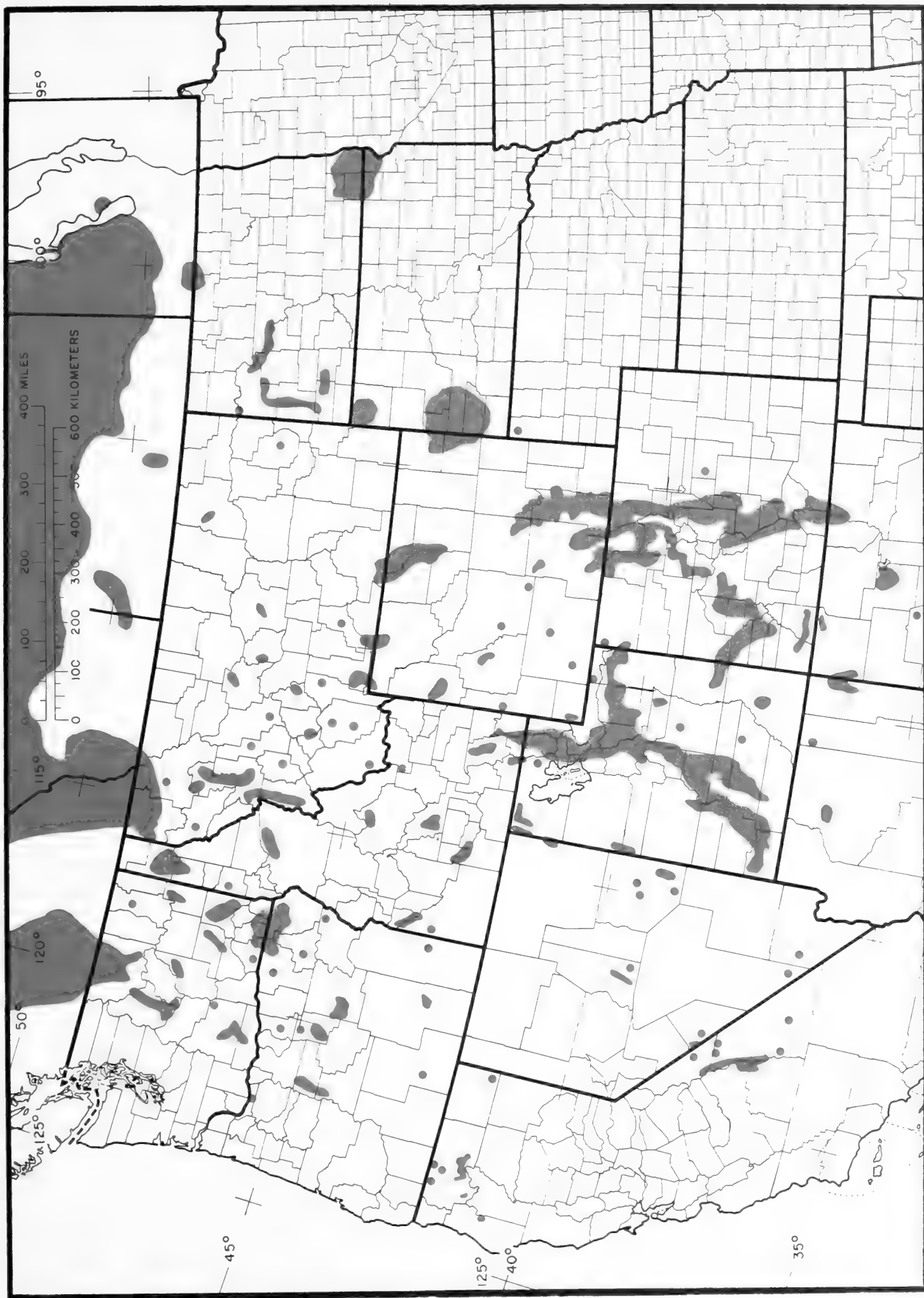
Map 21-NW. *Artemisia tridentata* Nutt., big sagebrush, northern range.



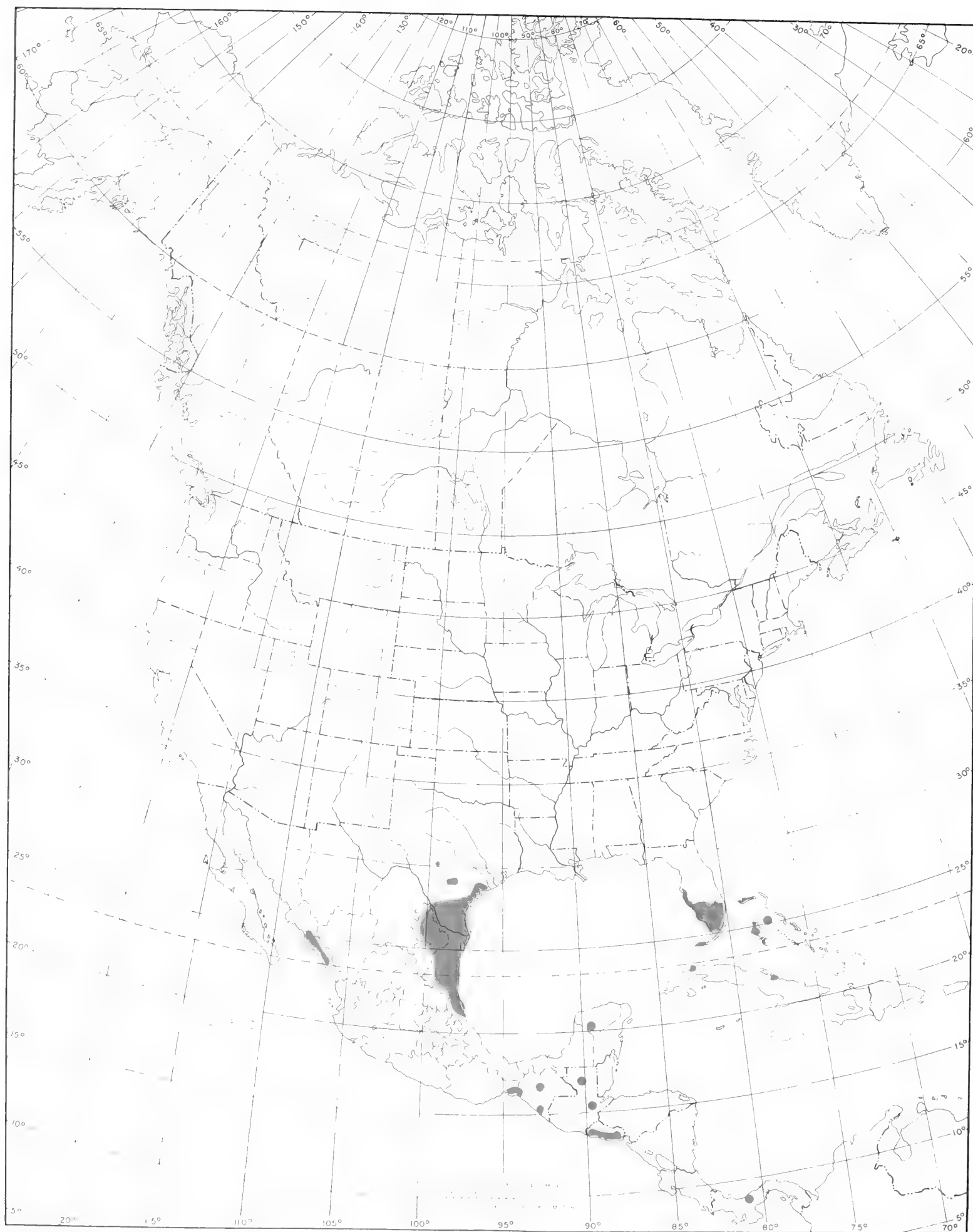
Map 21-SW. *Artemisia tridentata* Nutt., big sagebrush, southern range.



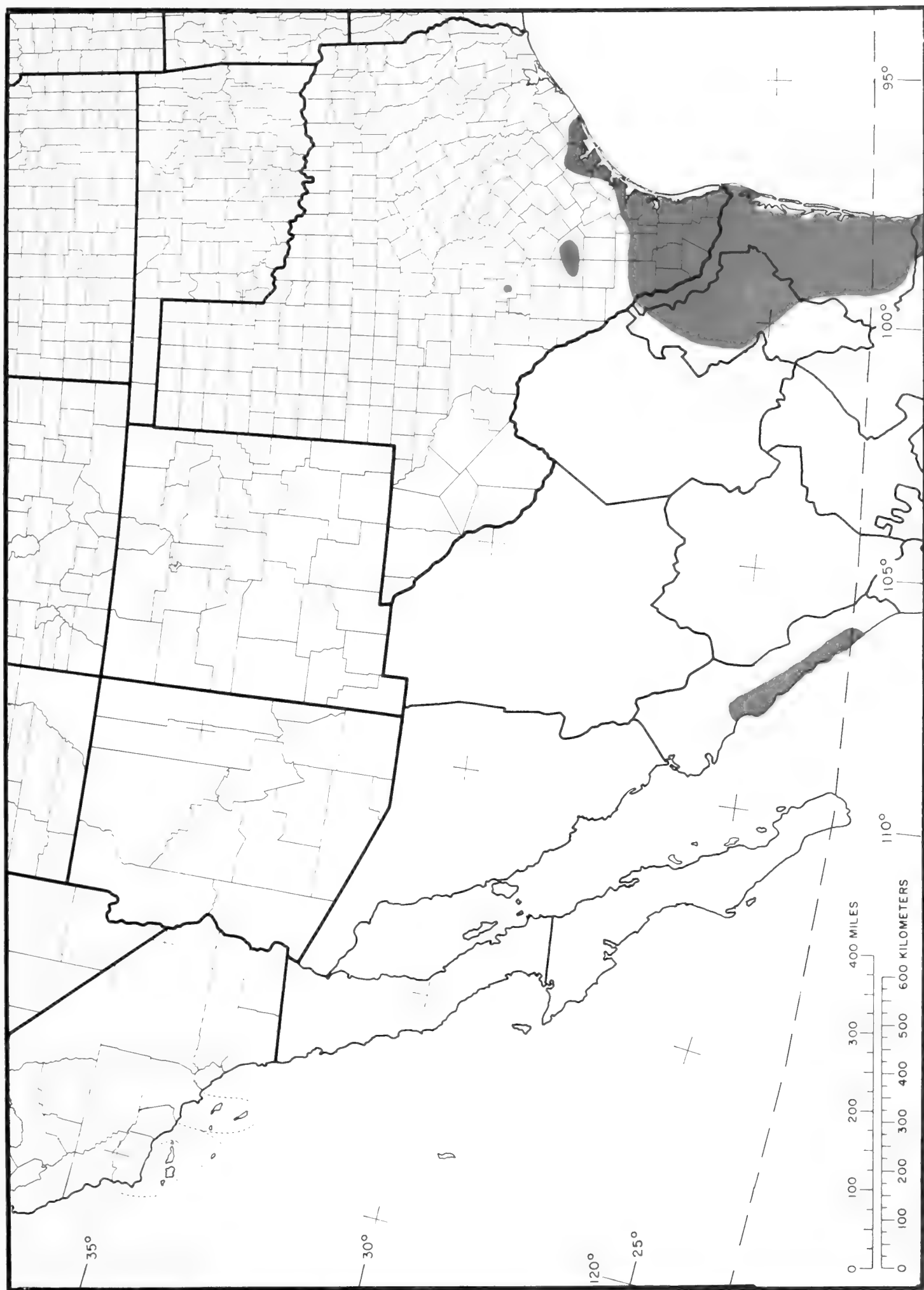
Map 22-N. *Betula occidentalis* Hook., water birch.



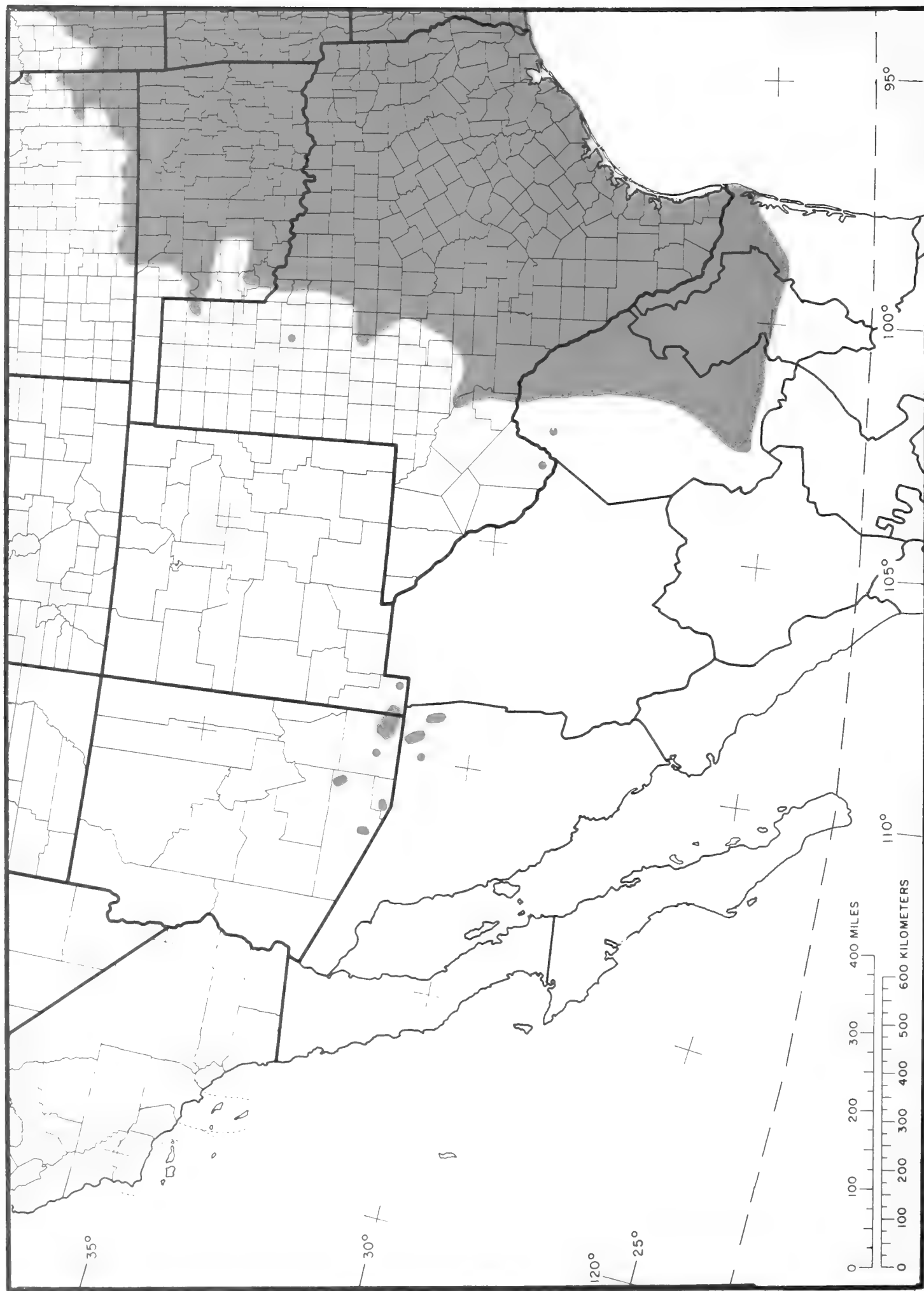
Map 22-NW. *Betula occidentalis* Hook., water birch.



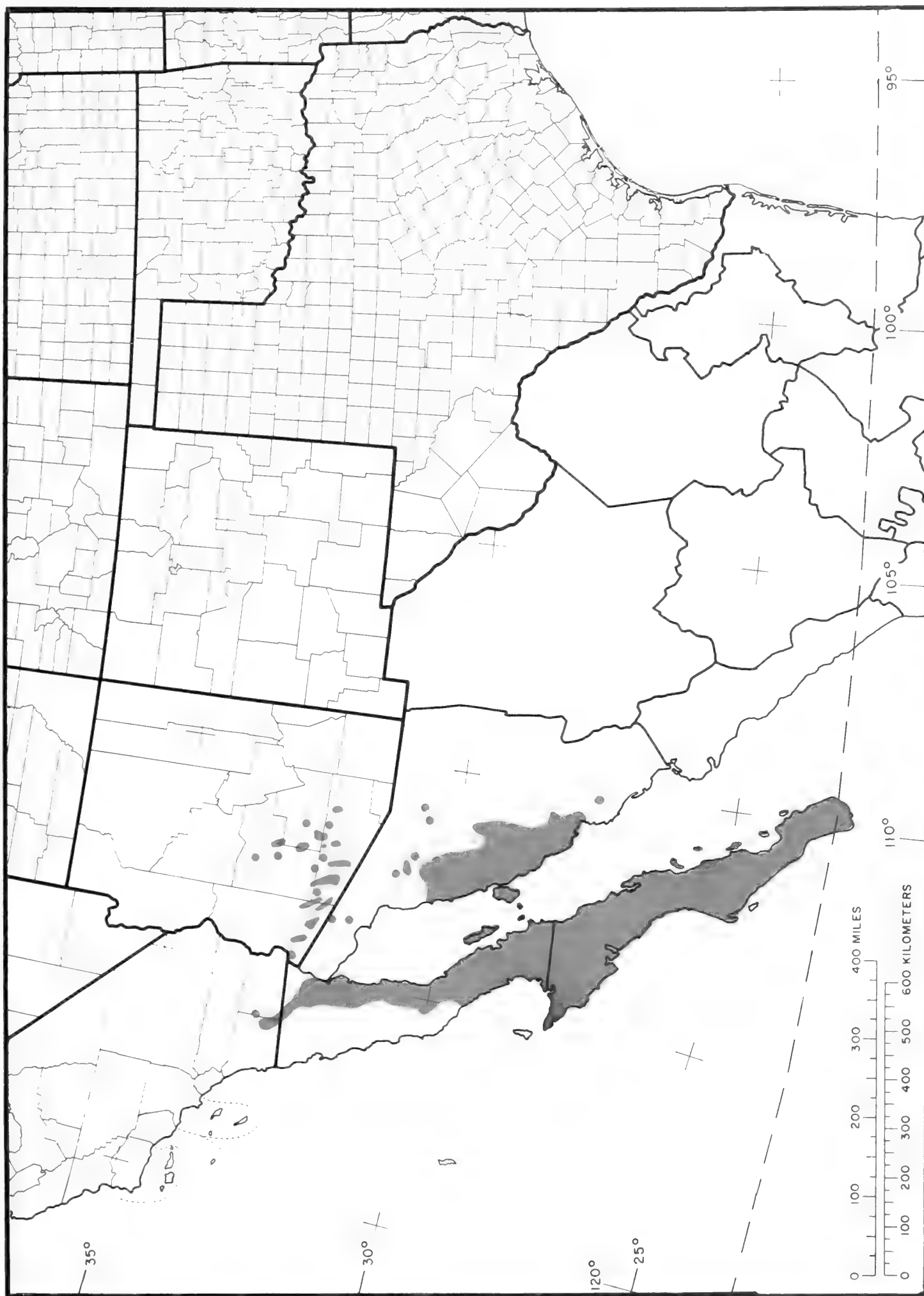
Map 23-N. *Bumelia celastrina* H.B.K., saffron-plum.



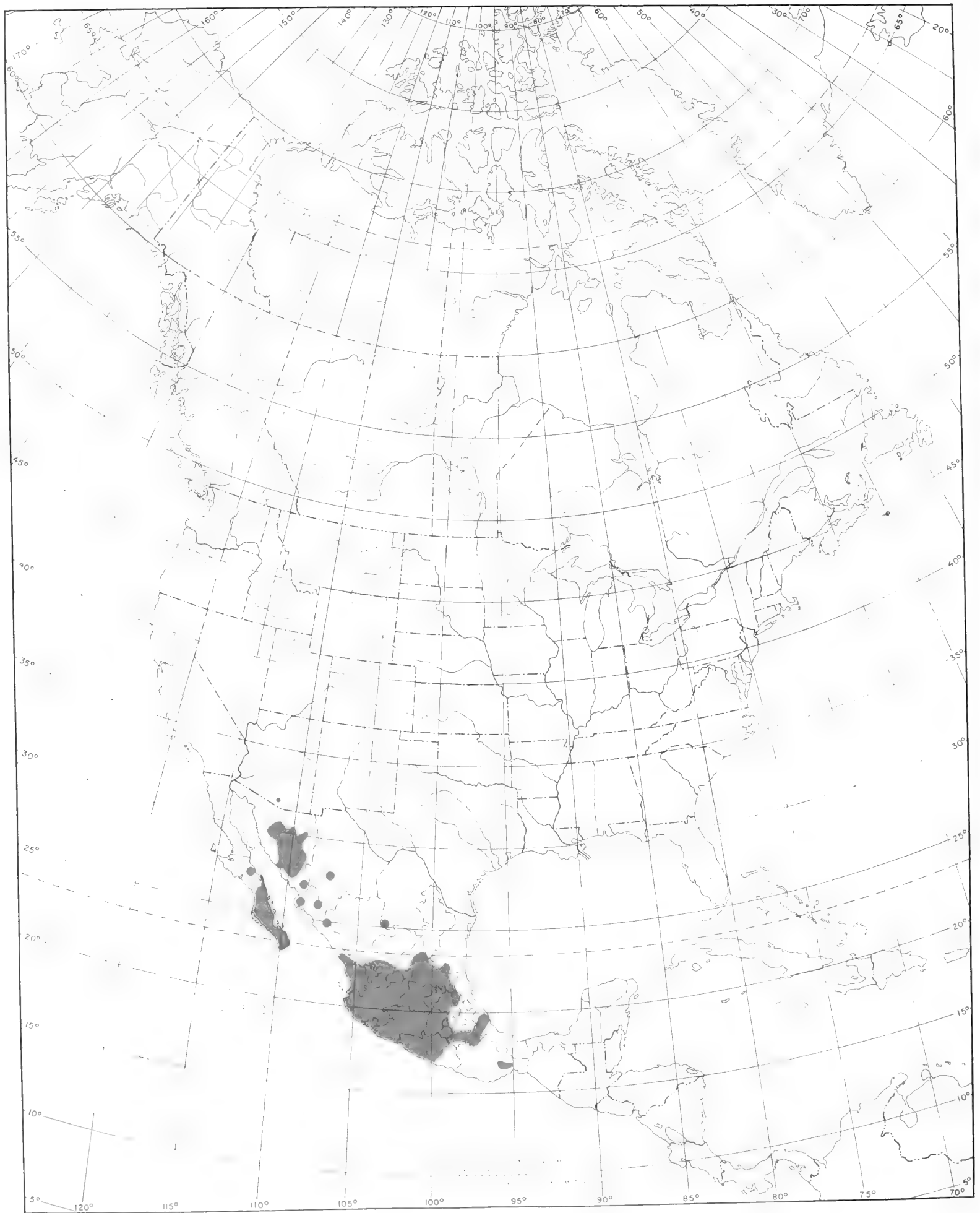
Map 23-SW. *Bumelia celastrina* H.B.K., saffron-plum.



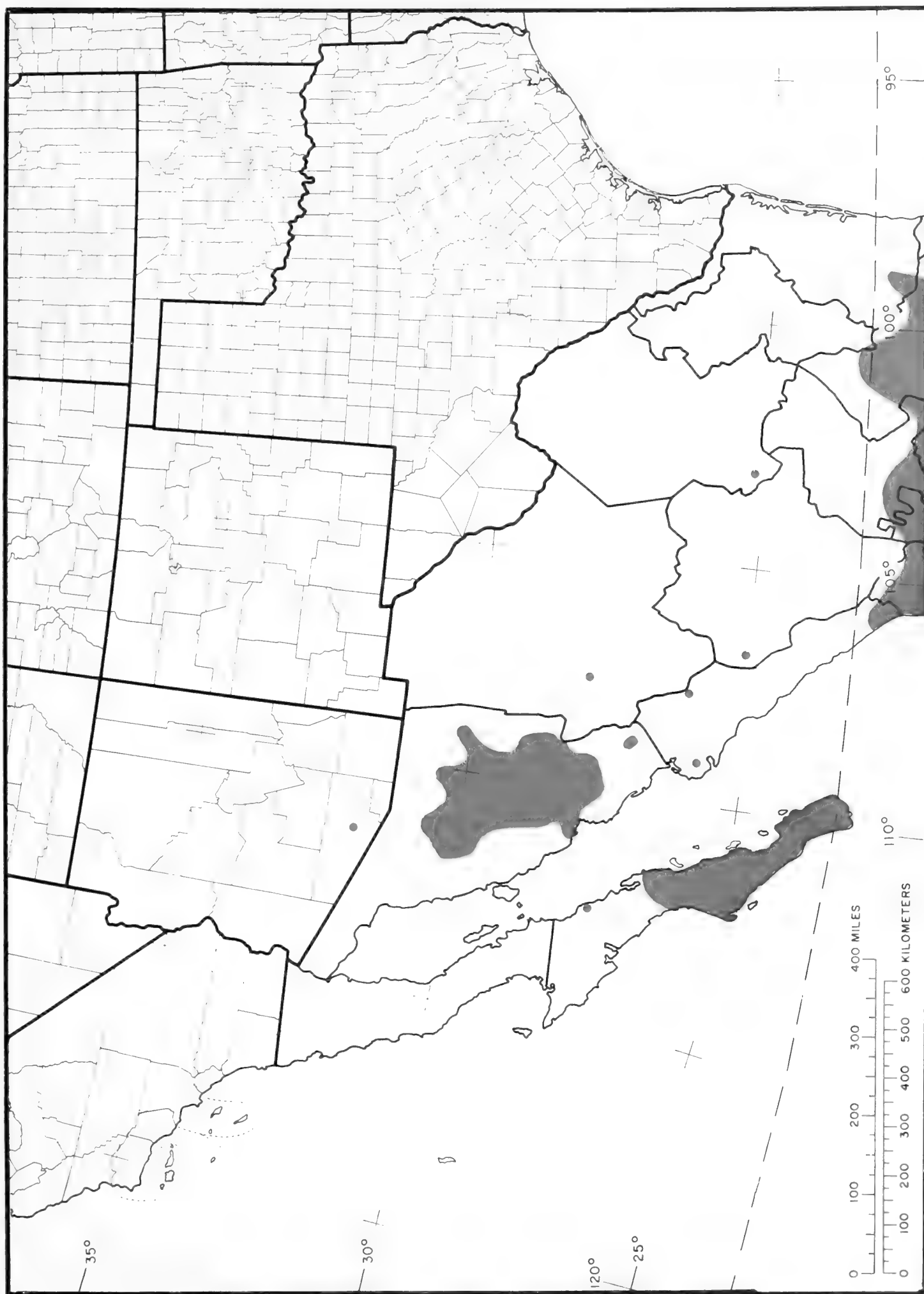
Map 24. *Bumelia lanuginosa* (Michx.) Pers., gum bumelia. Eastern range in Volume 4.



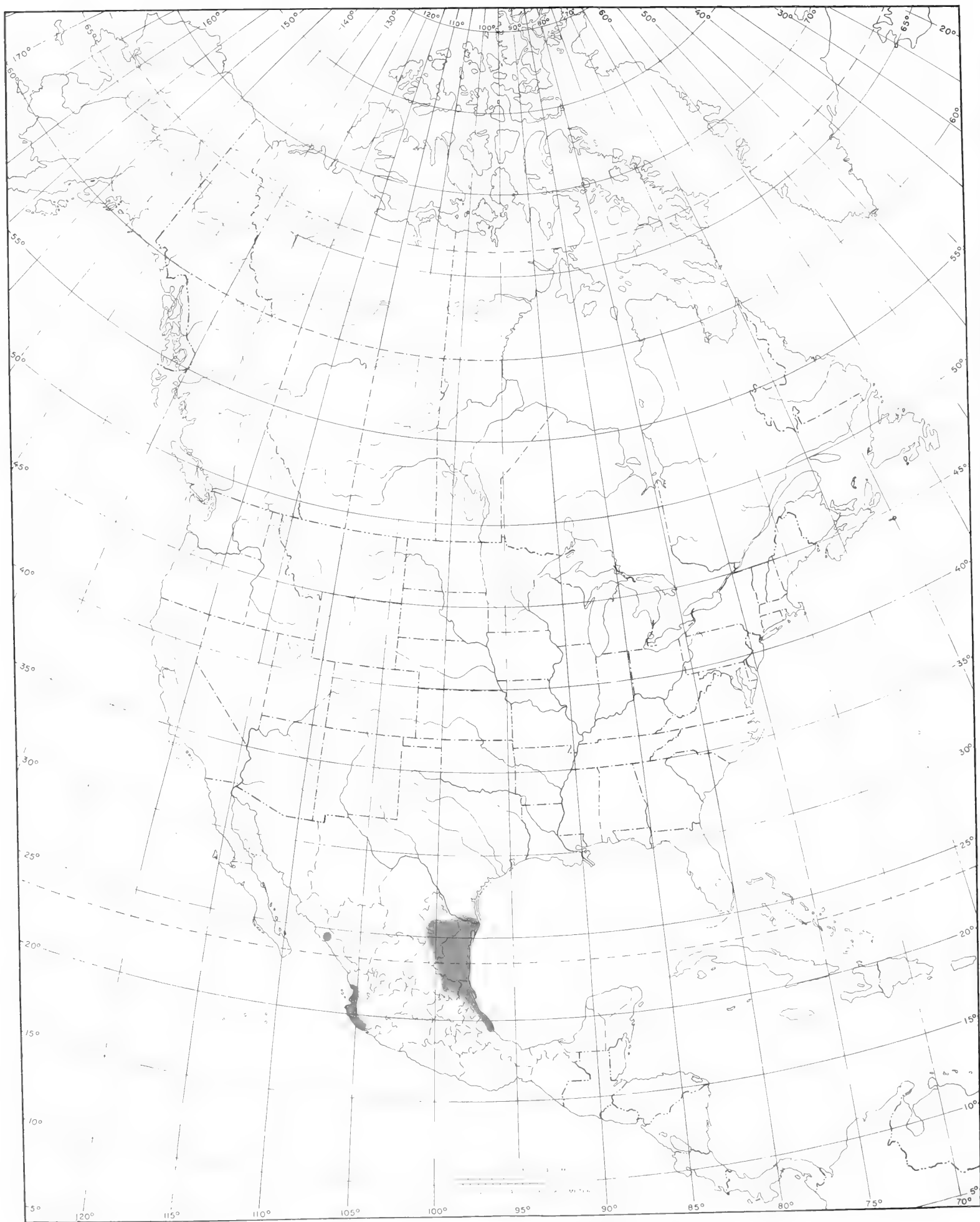
Map 25. *Bursera microphylla* A. Gray, elephanttree. Southwestern Arizona, extreme southern California, Baja California, and Sonora.



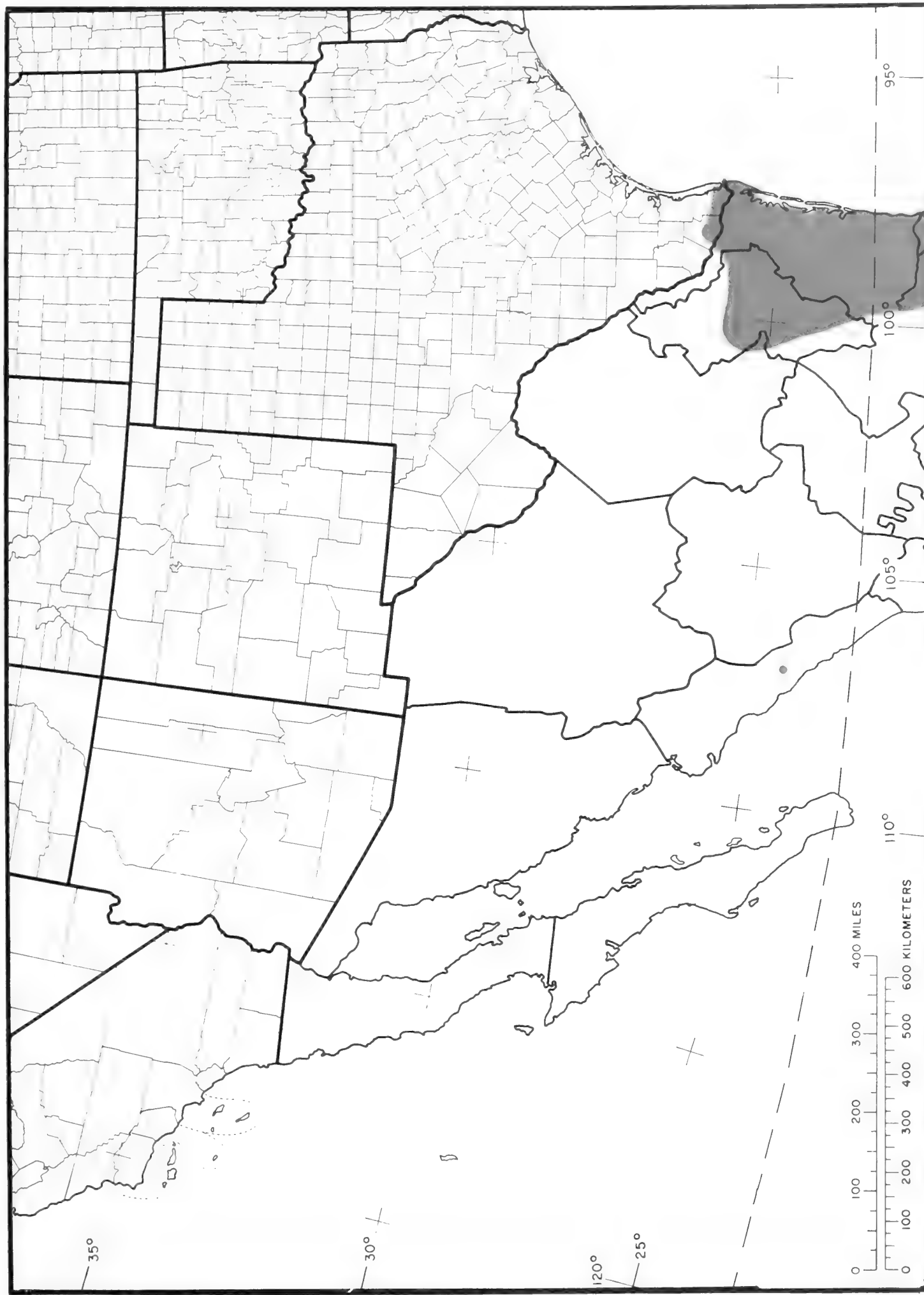
Map 26-N. *Bursera fagaroides* (H.B.K.) Engler, fragrant bursera.



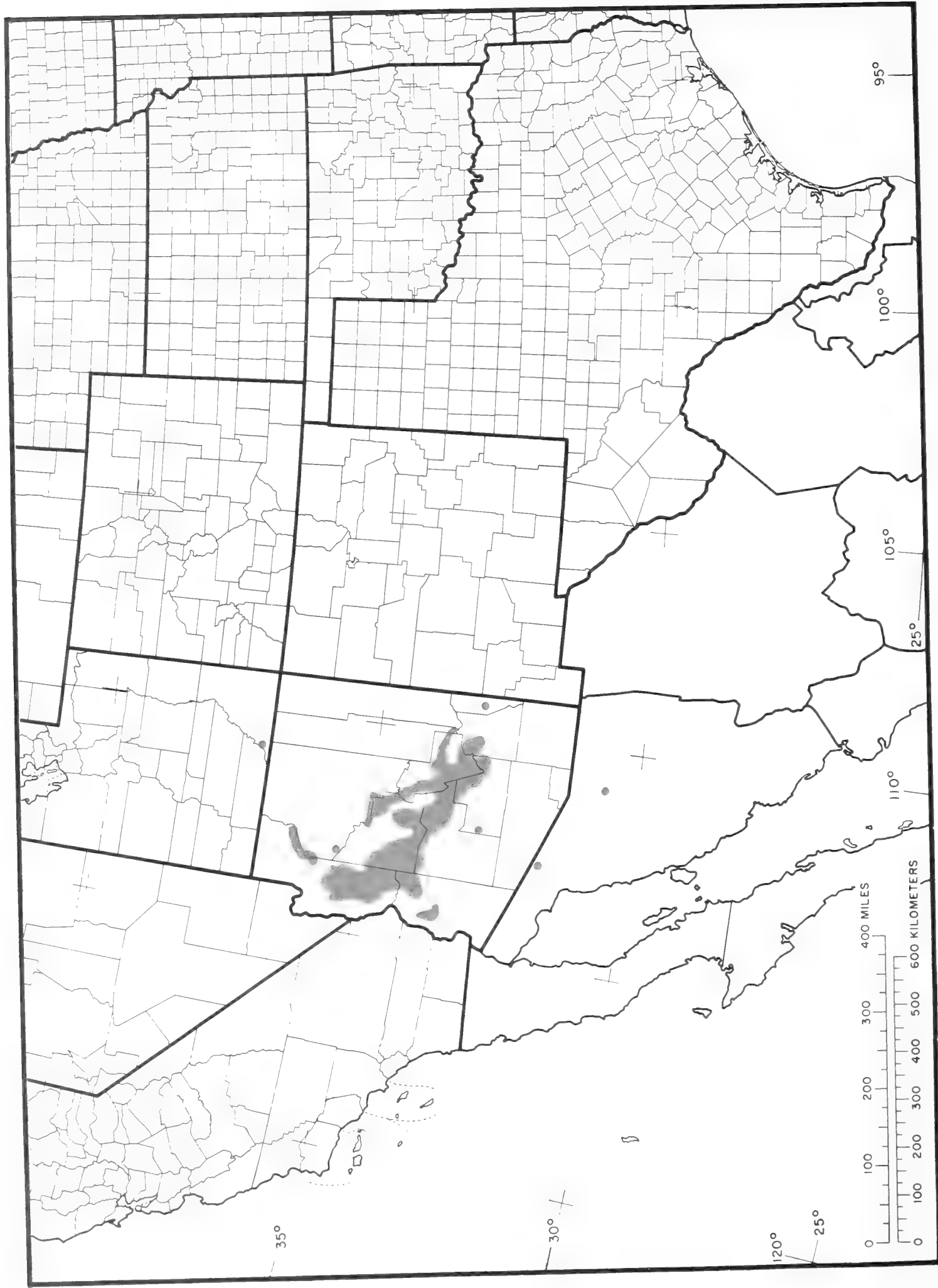
Map 26-SW. *Bursera jagaroides* (H.B.K.) Engler, fragrant bursera. Southern Arizona (1 locality) and Mexico.



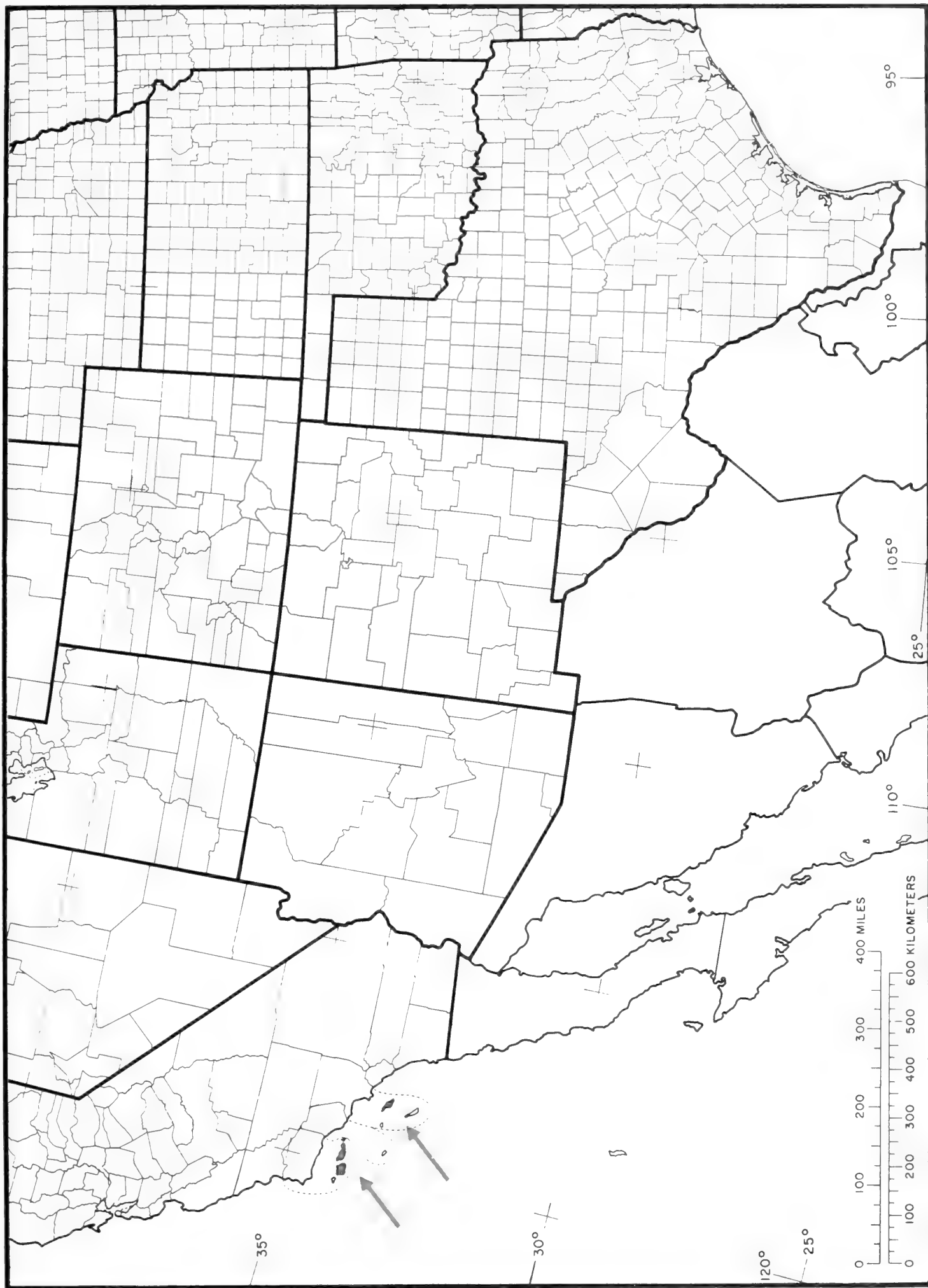
Map 27-*N. Caesalpinia mexicana* A. Gray, Mexican poinciana.



Map 27-SW. *Caesalpinia mexicana* A. Gray, Mexican poinciana. Extreme southern Texas and Mexico.



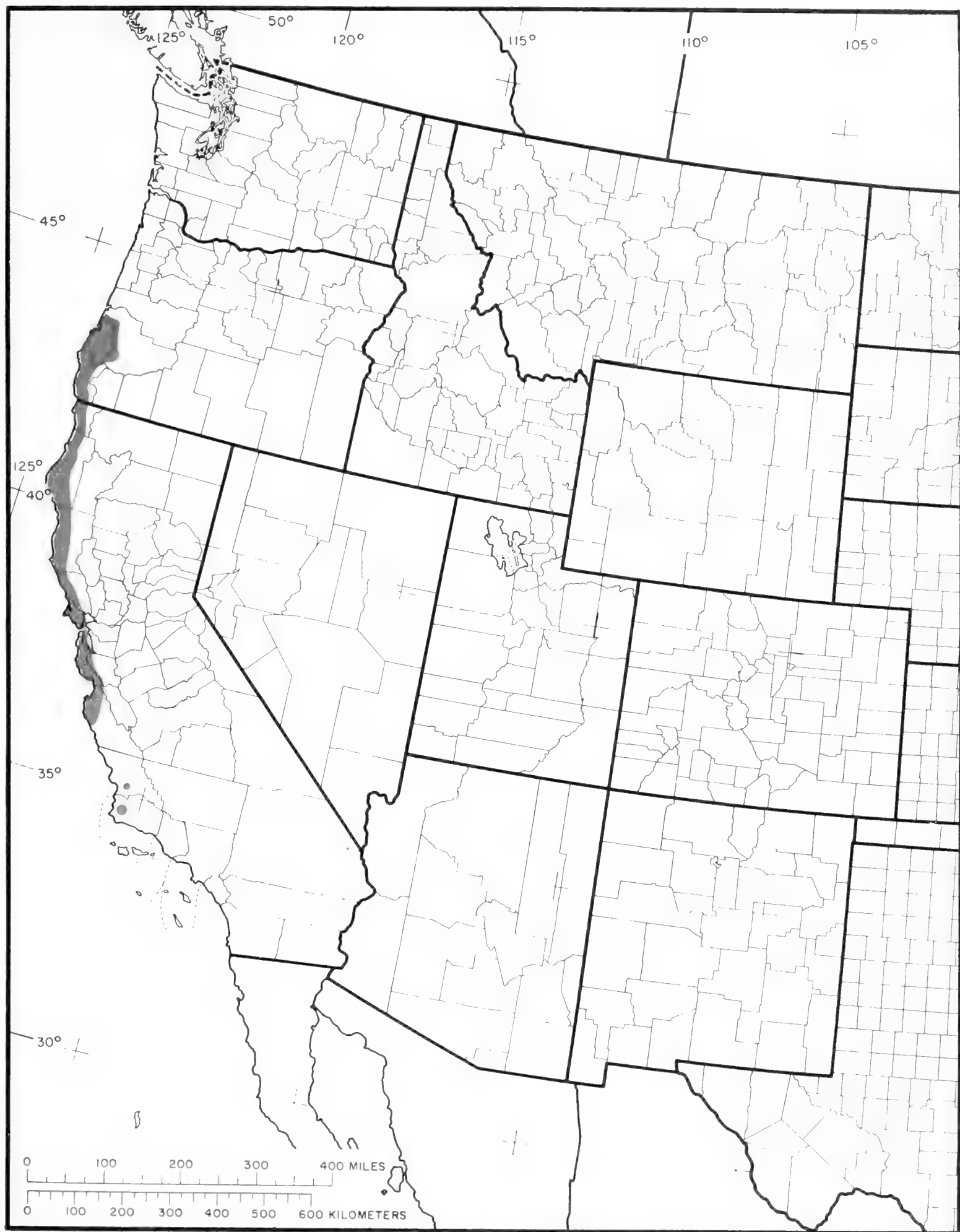
Map 28. *Canotia holocantha* Torr., canotia. Arizona, also extreme southern Utah and northern Sonora.



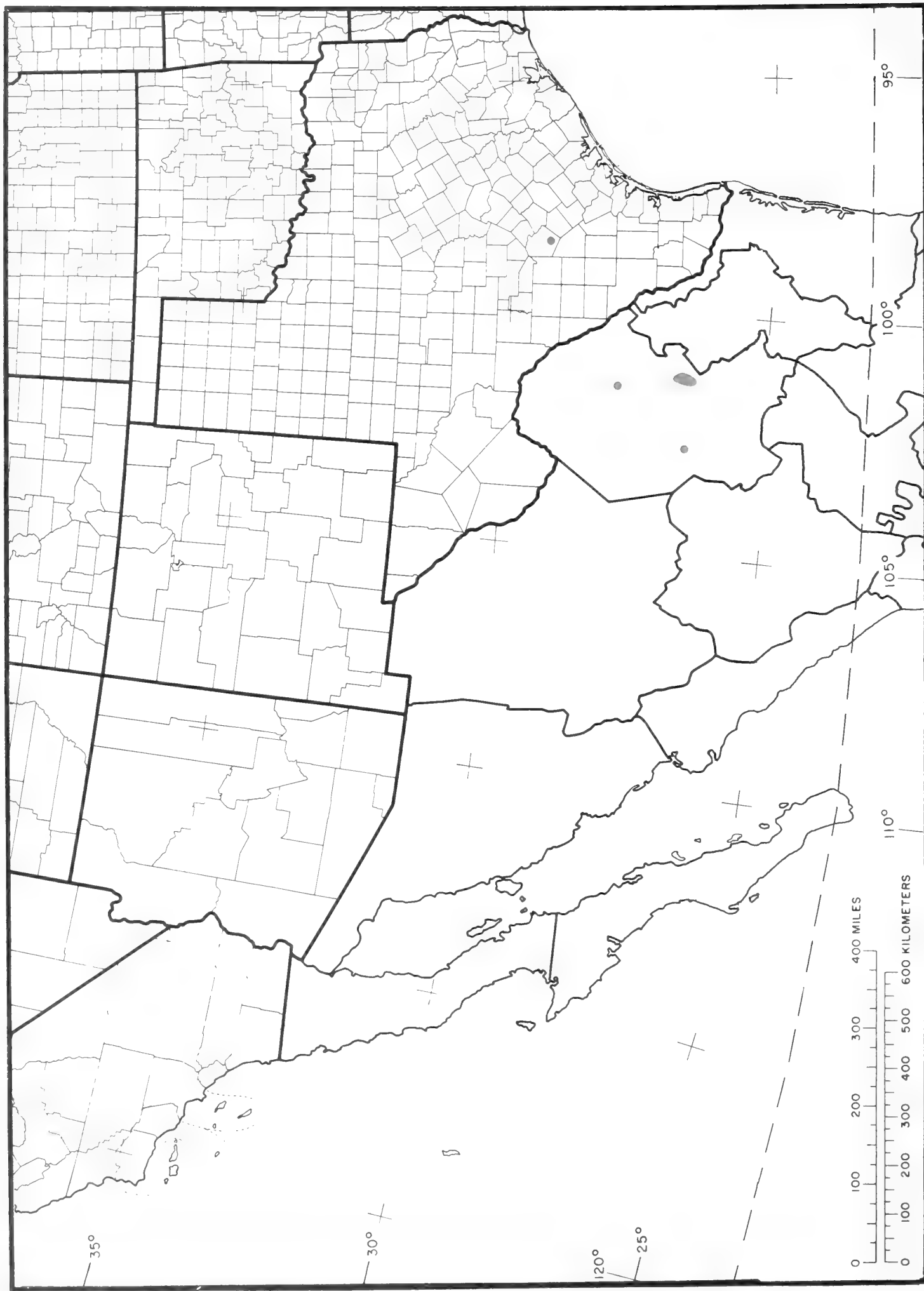
Map 29. *Ceanothus arboreus* Greene, feltleaf ceanothus, Santa Rosa, Santa Cruz, and Santa Catalina Islands of California only.



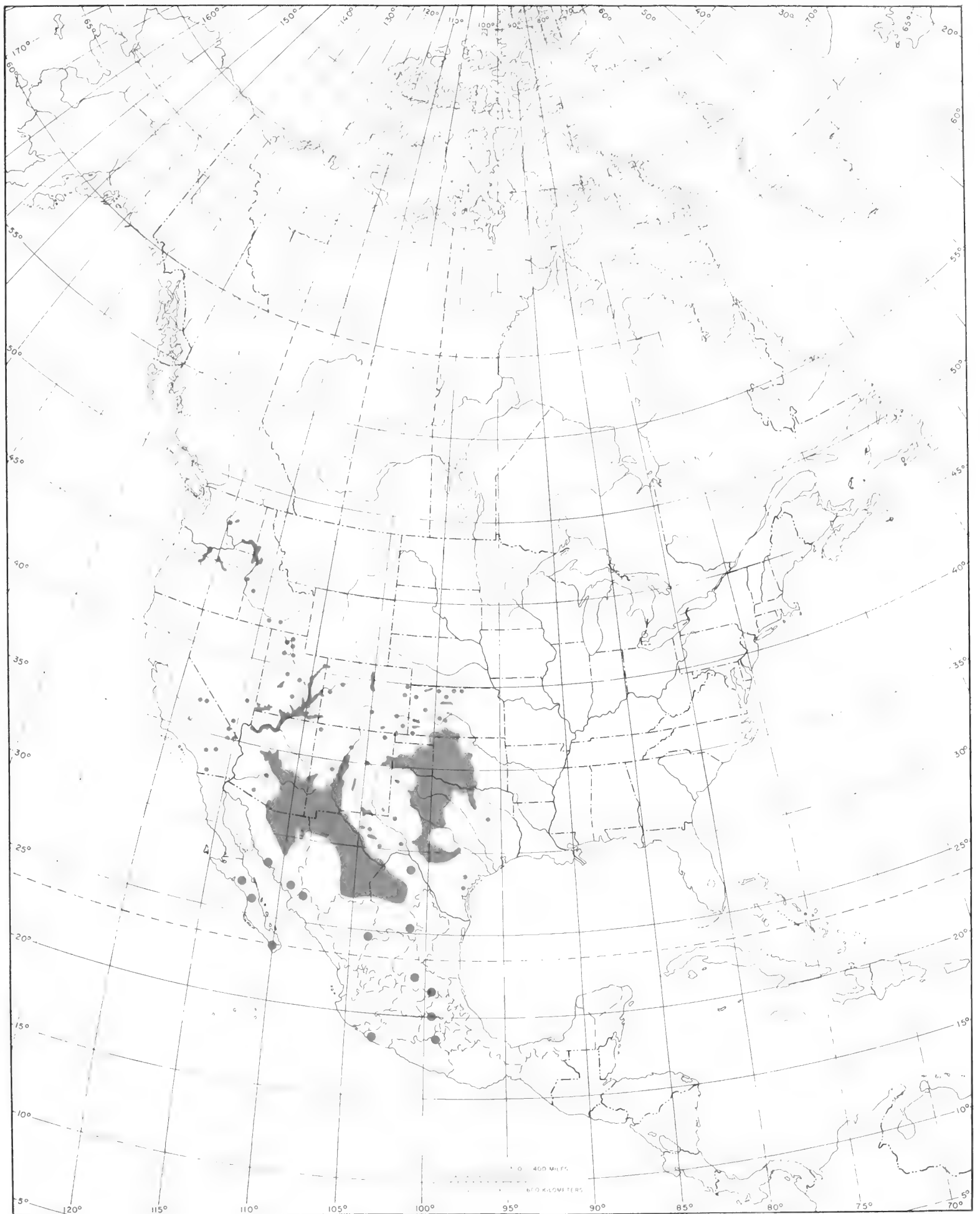
Map 30. *Ceanothus spinosus* Nutt., spiny ceanothus. Southern California and northern Baja California only.



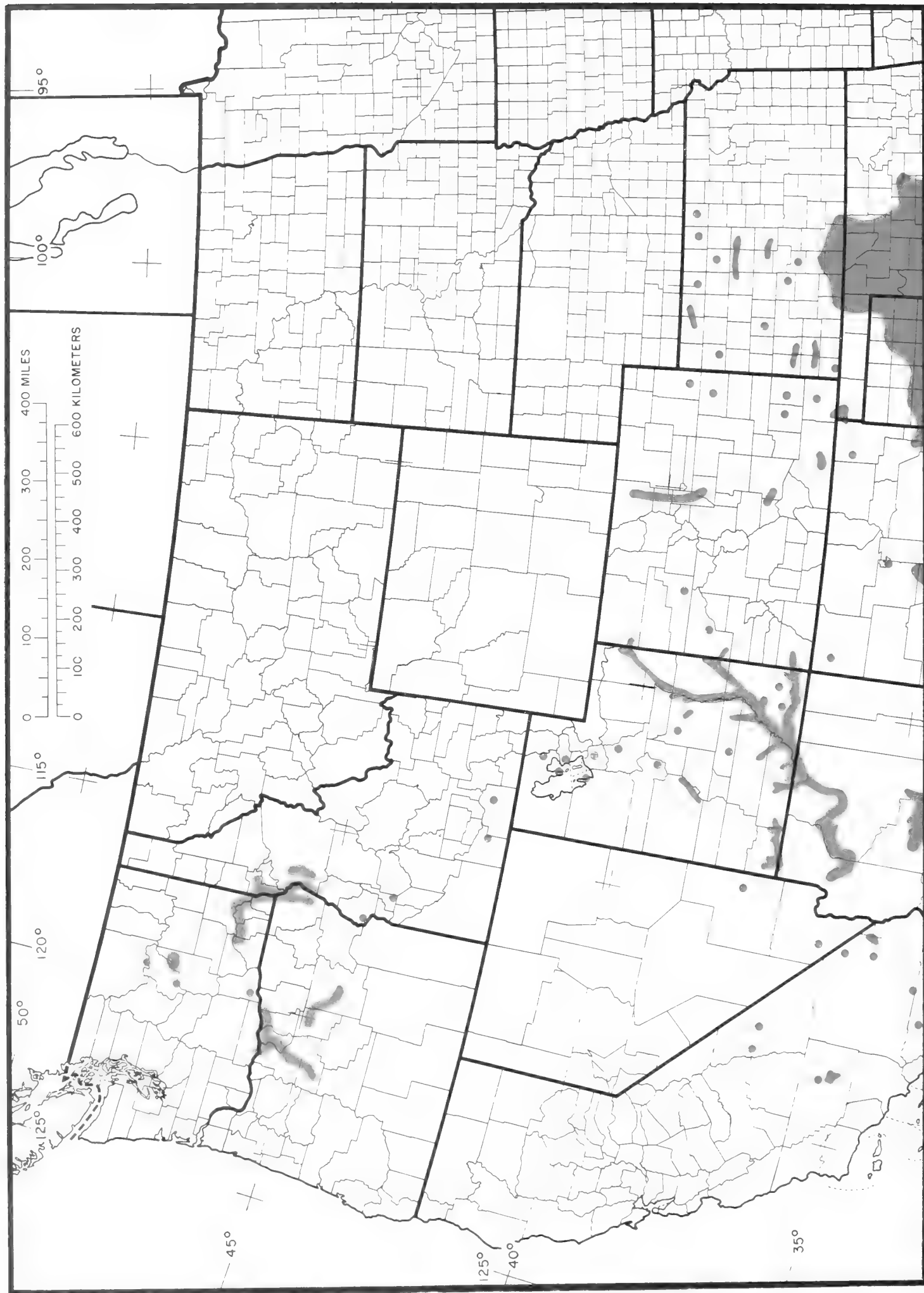
Map 31. *Ceanothus thyrsiflorus* Eschsch., blueblossom.



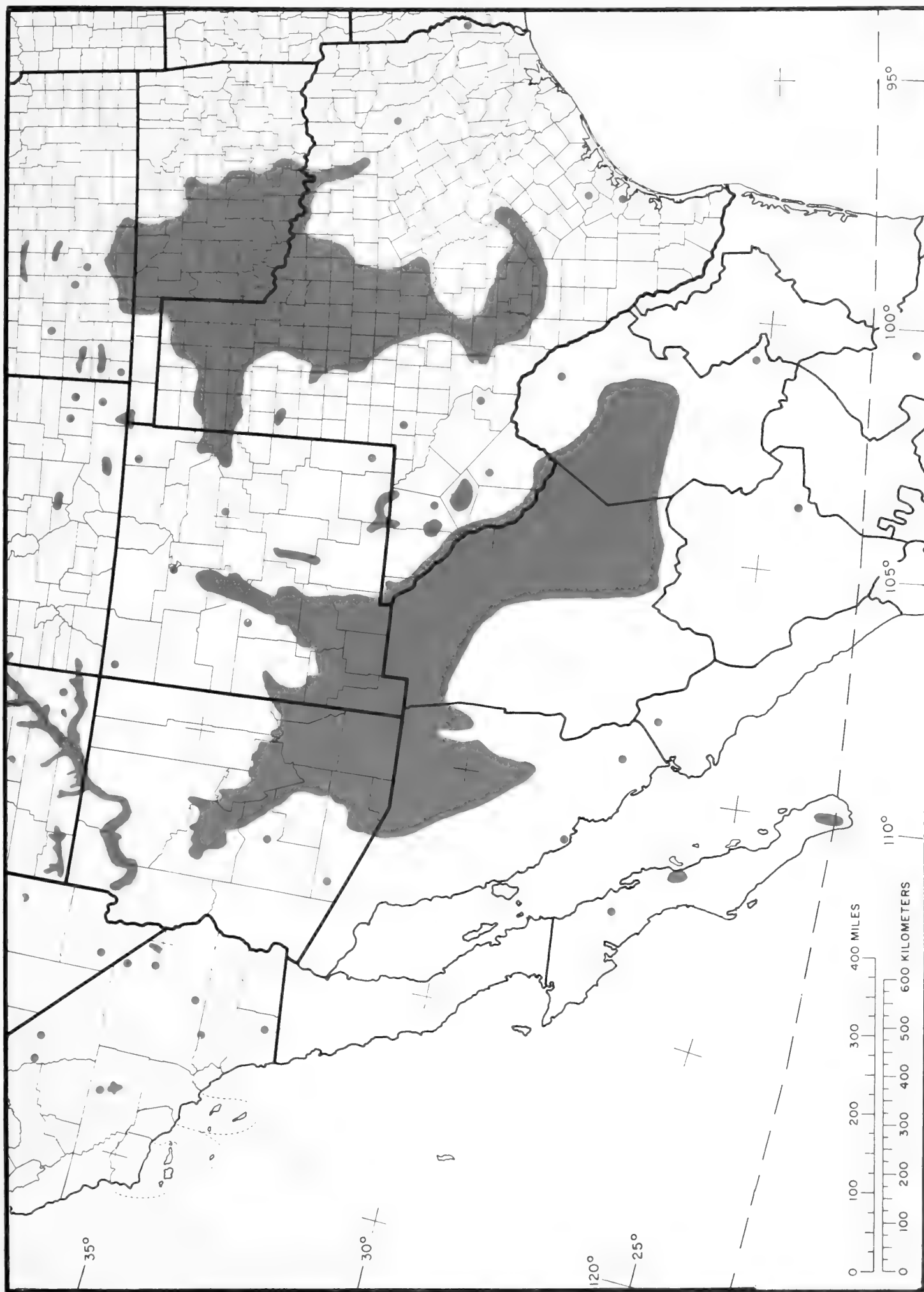
Map 32. *Celtis lindheimeri* Engelm., Lindheimer hackberry. Texas and Coahuila only.



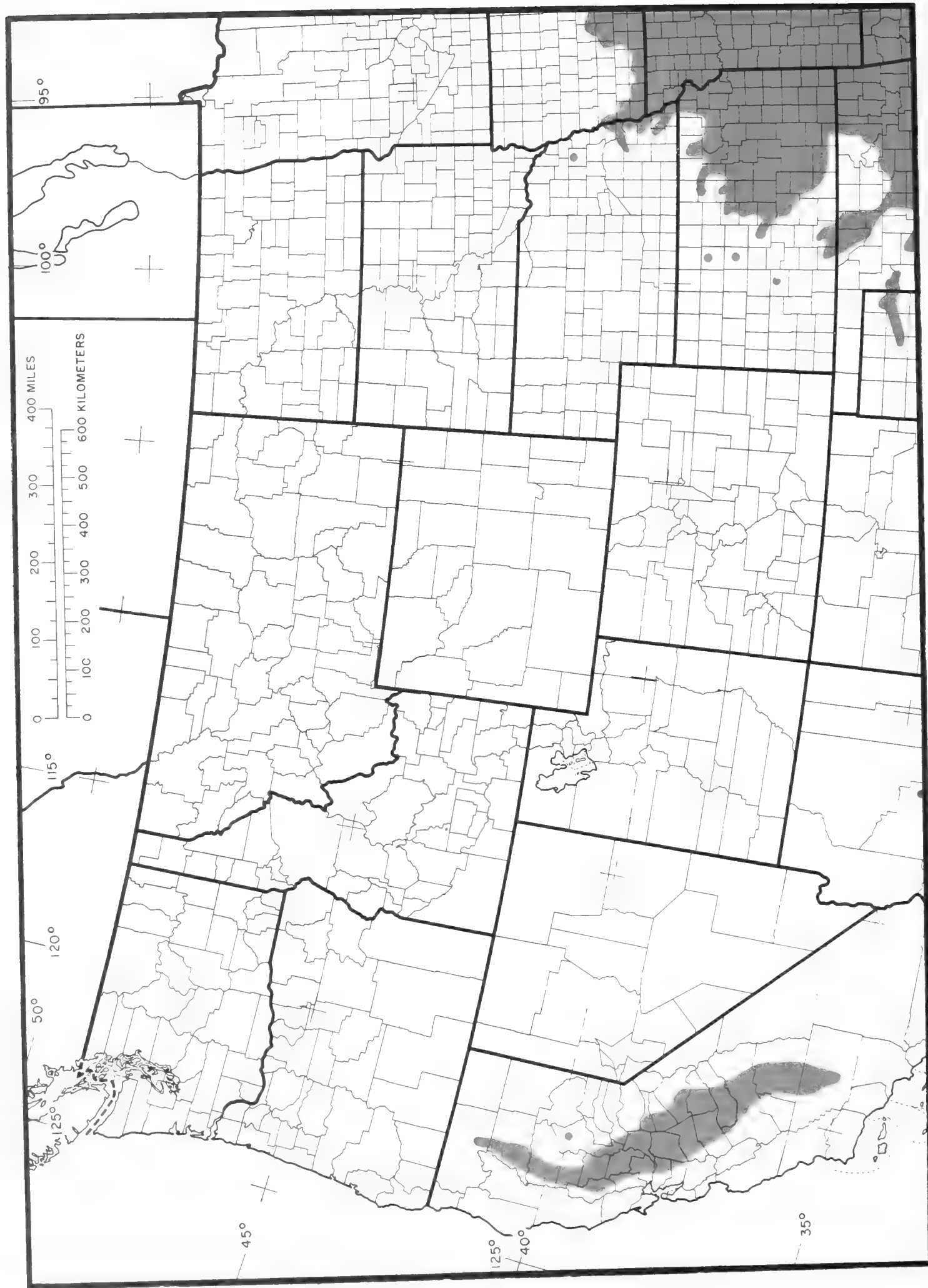
Map 33-N. *Celtis reticulata* Torr., netleaf hackberry.



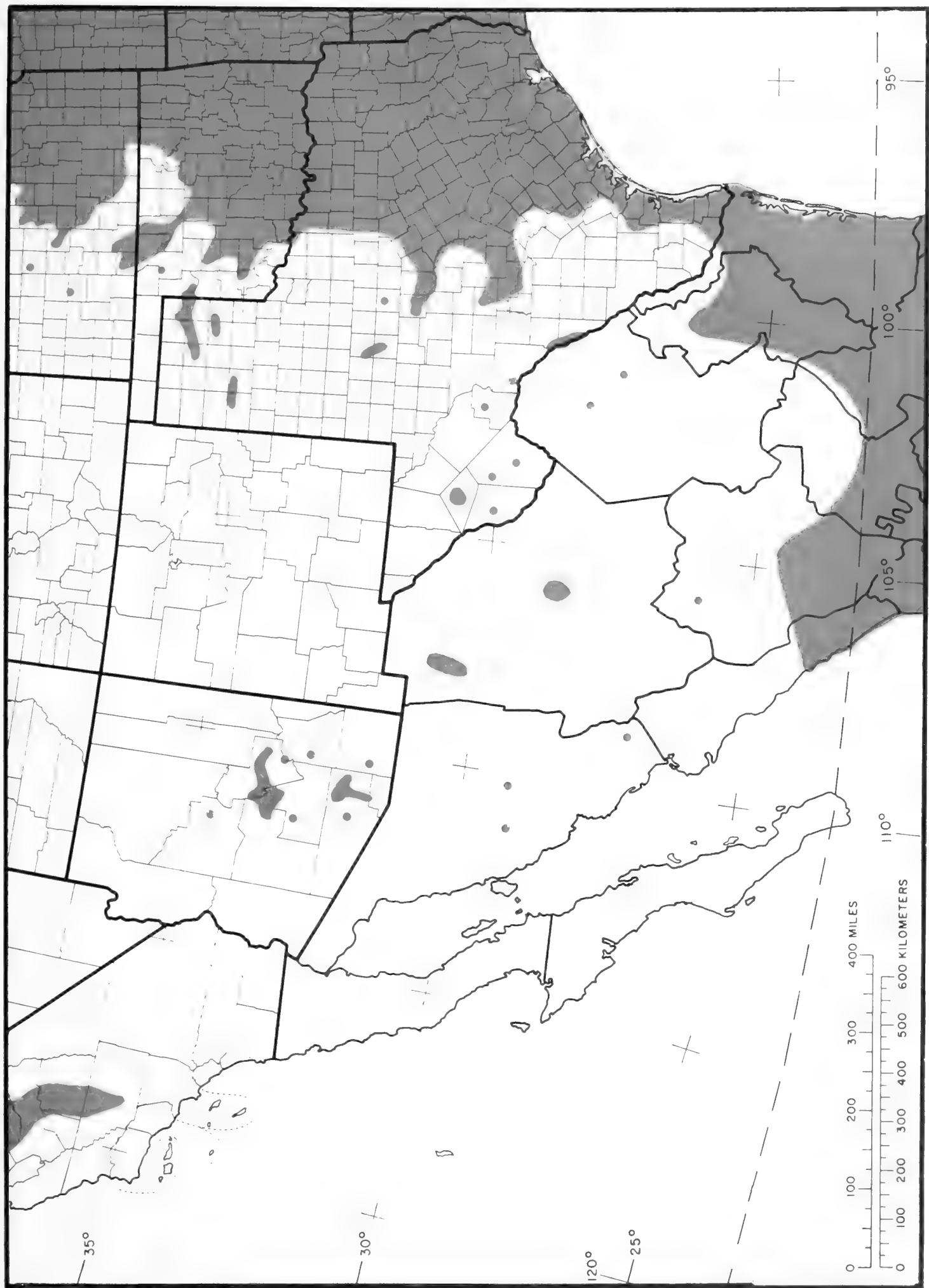
Map 33-NW. *Celtis reticulata* Torr., netleaf hackberry, northern range.



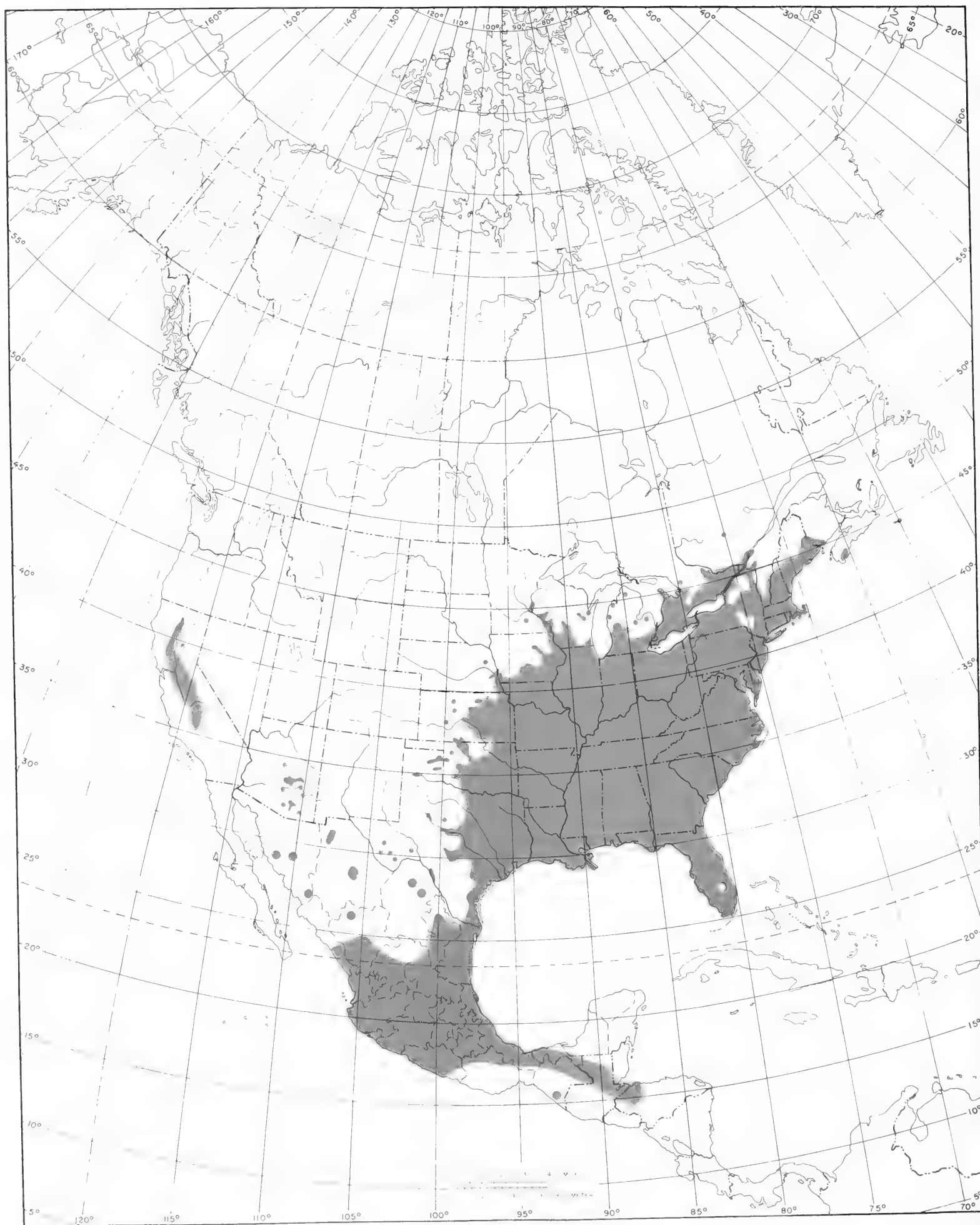
Map 33-SW. *Celtis reticulata* Torr., netleaf hackberry, southern range.



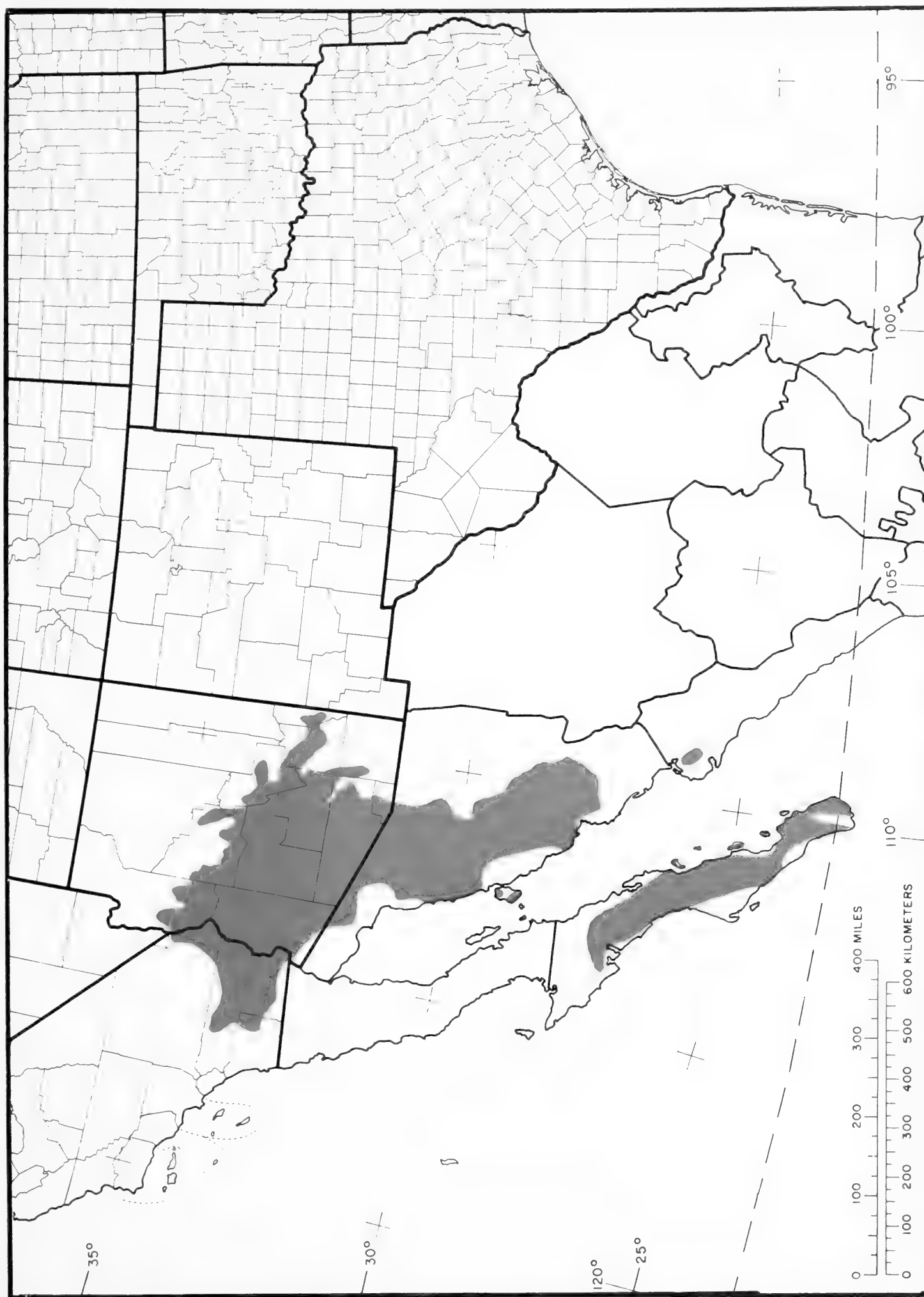
Map 34-NW. *Cephalanthus occidentalis* L., common buttonbush.



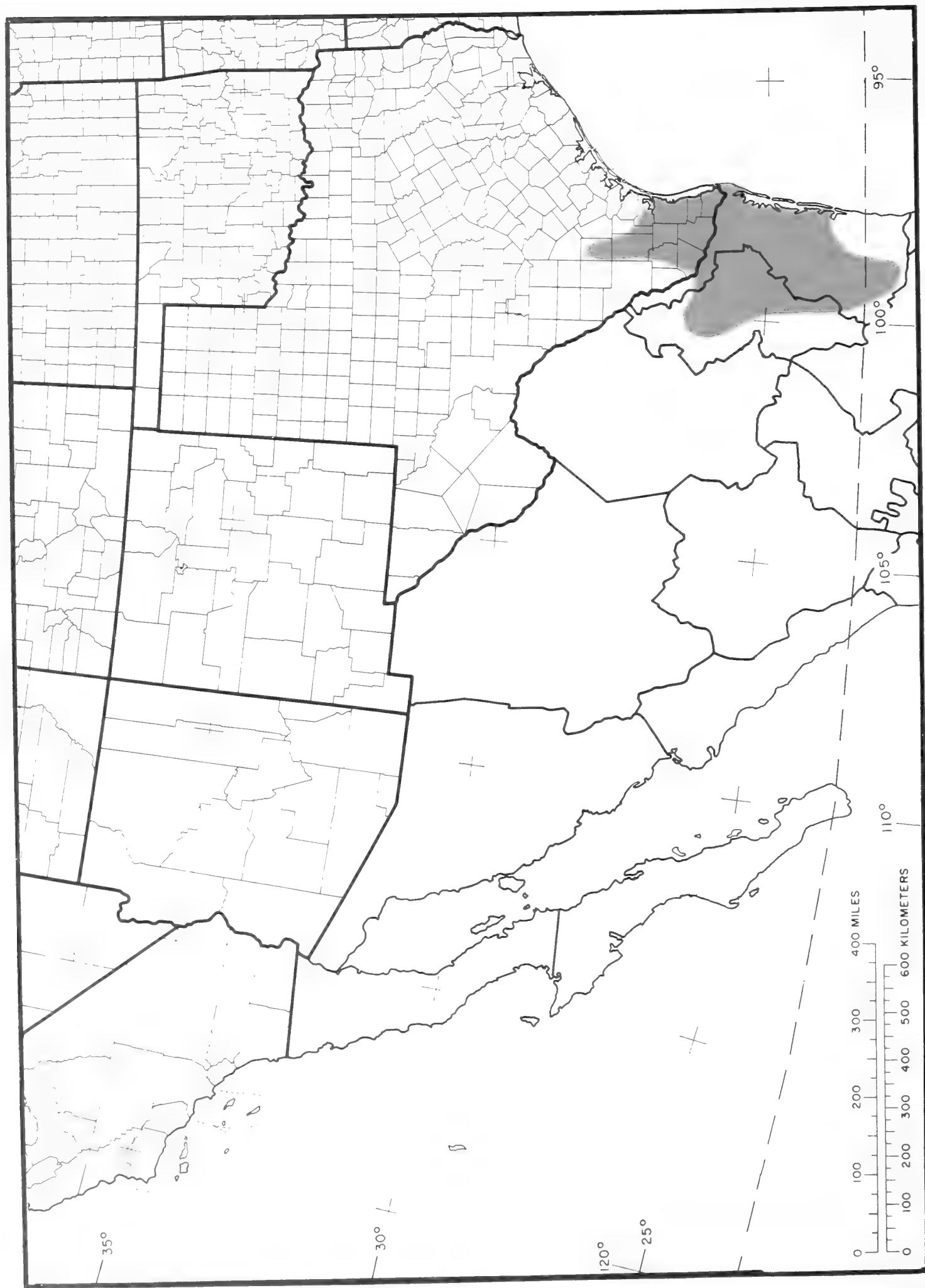
Map 34-SW. *Cephalanthus occidentalis* L., common buttonbush.



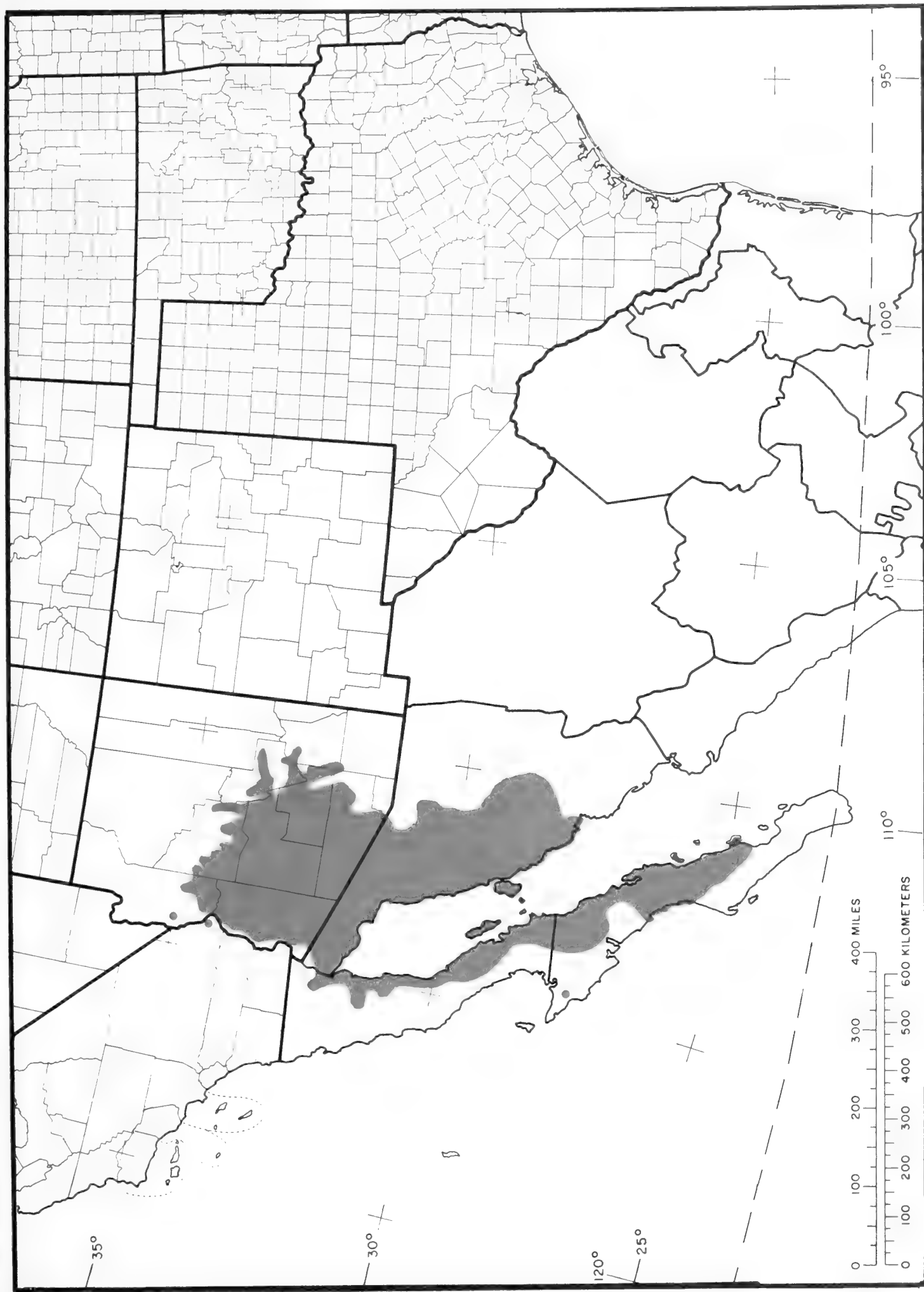
Map 31-N. *Cephalanthus occidentalis* L., common buttonbush. The same or a closely related species also in eastern Asia.



Map 35. *Cercidium floridum* Benth., blue paloverde.



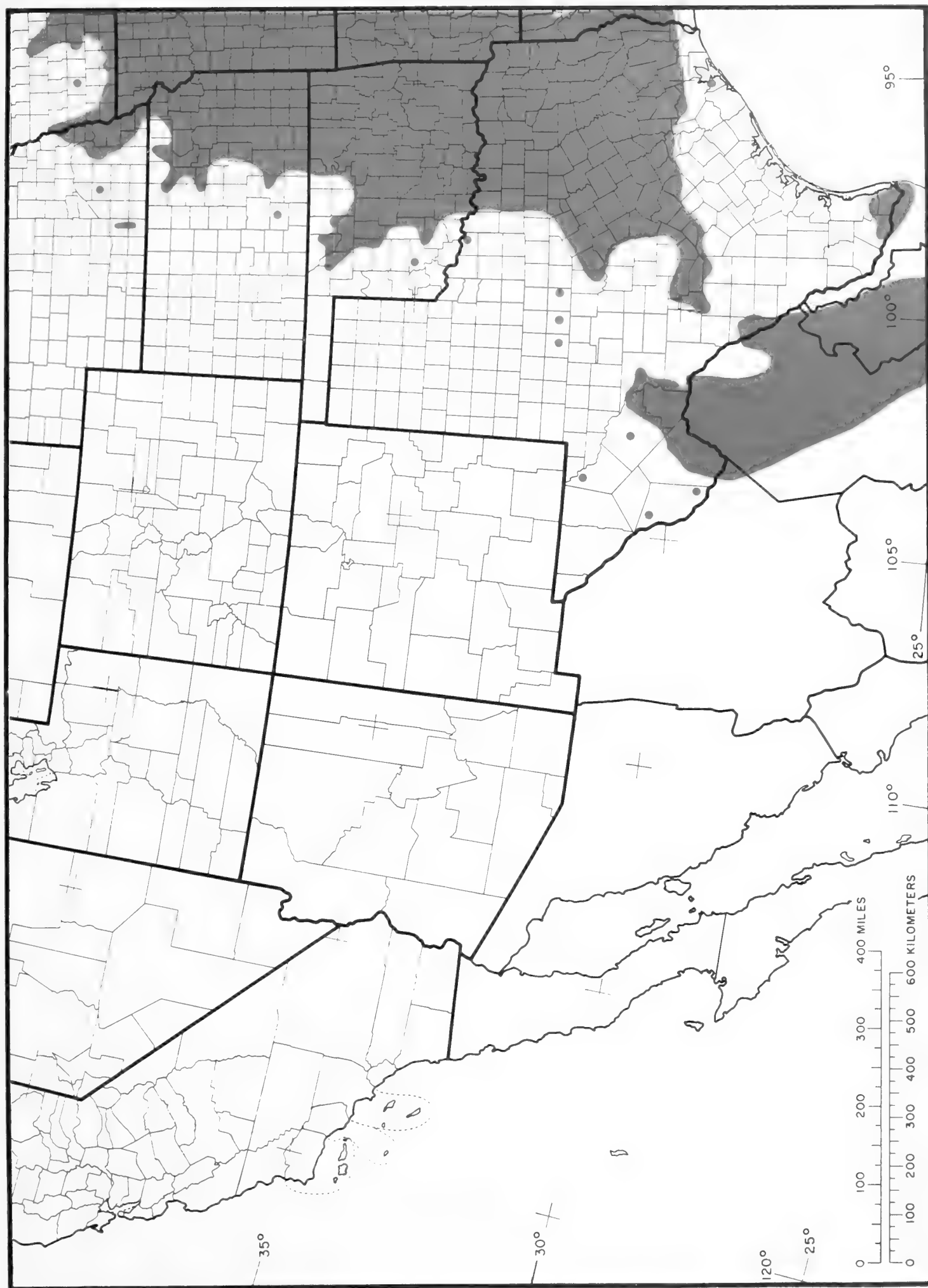
Map 36. *Cercidium macrum* Johnst., border paloverde. Southern Texas and northeastern Mexico only.



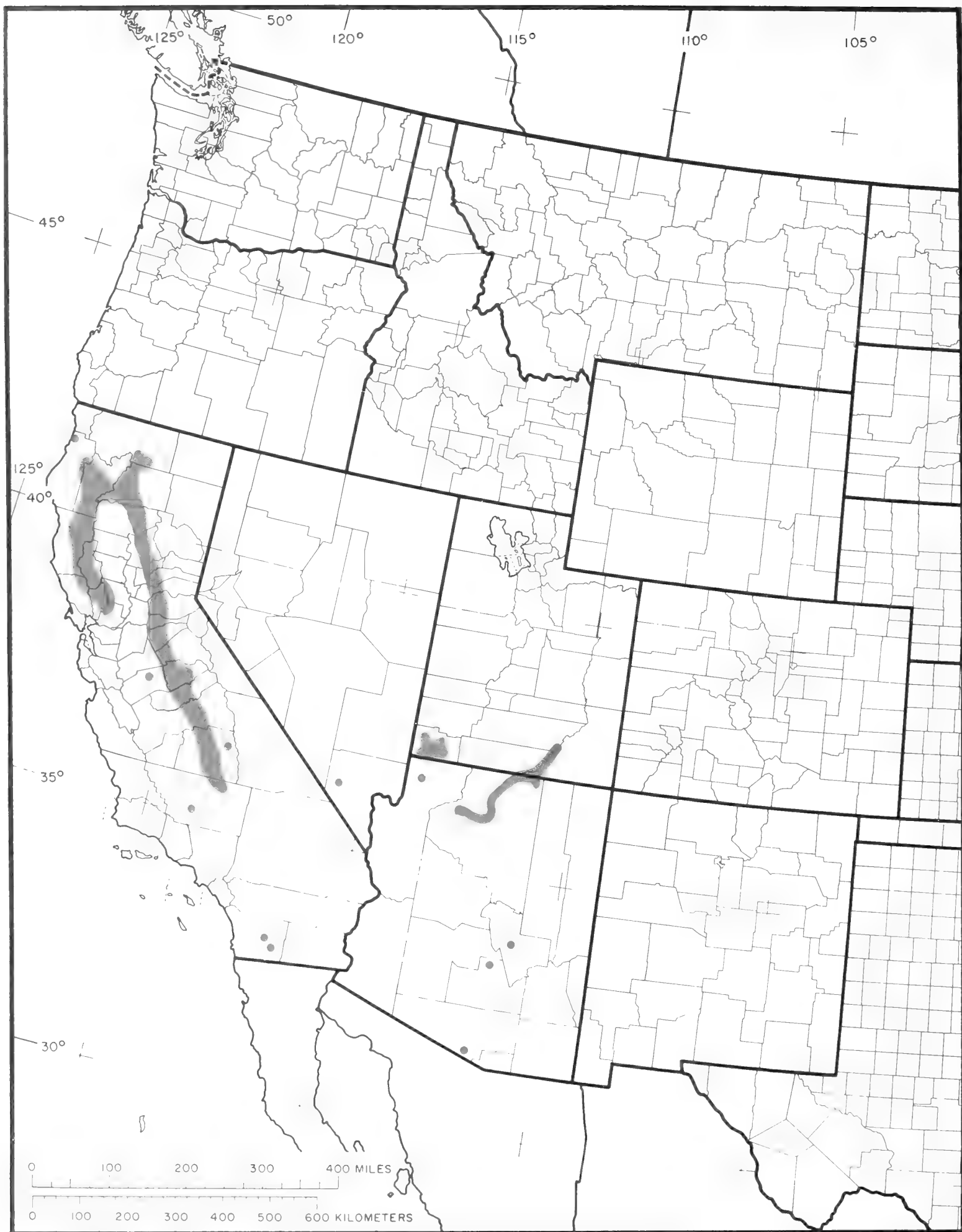
Map 37. *Cercidium microphyllum* (Torr.) Rose & Johnston, yellow paloverde. Arizona, southeastern California (I locality), Baja California, and Sonora.



Map 38-*N. Cercis canadensis* L., eastern redbud.



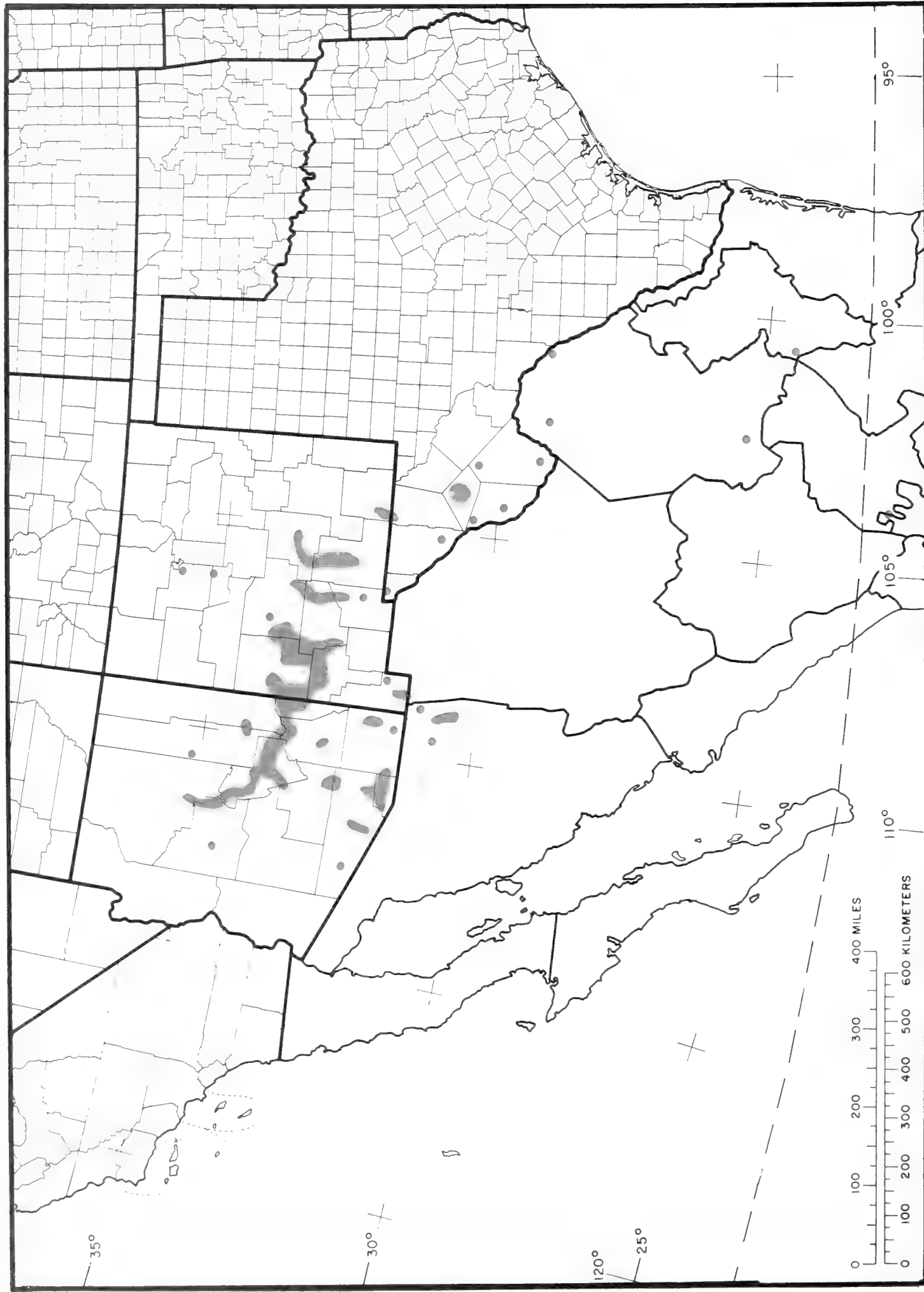
Map 38-SW. *Cercis canadensis* L., eastern redbud. Eastern range in Volume 4.



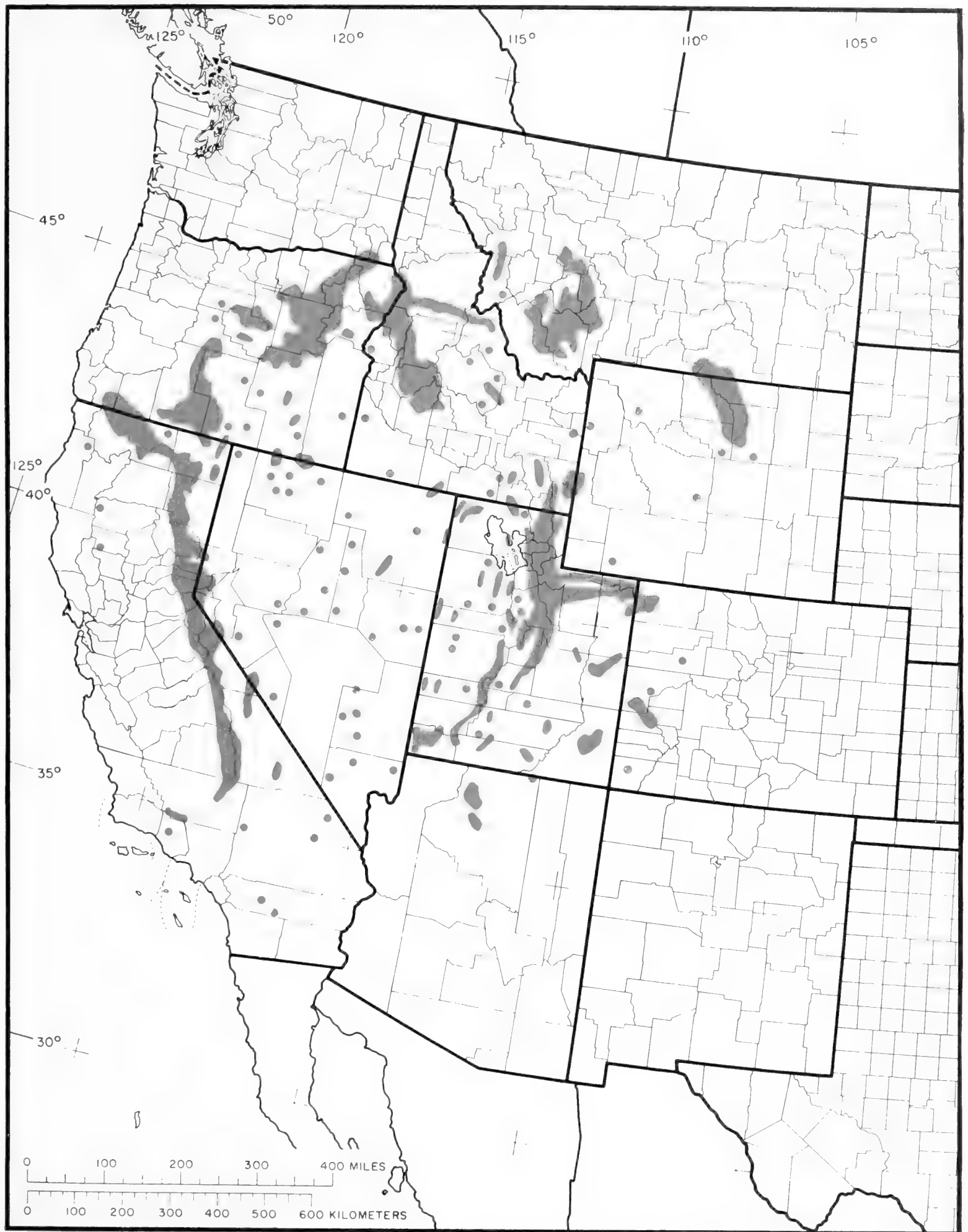
Map 39. *Cercis occidentalis* Torr.. California redbud.



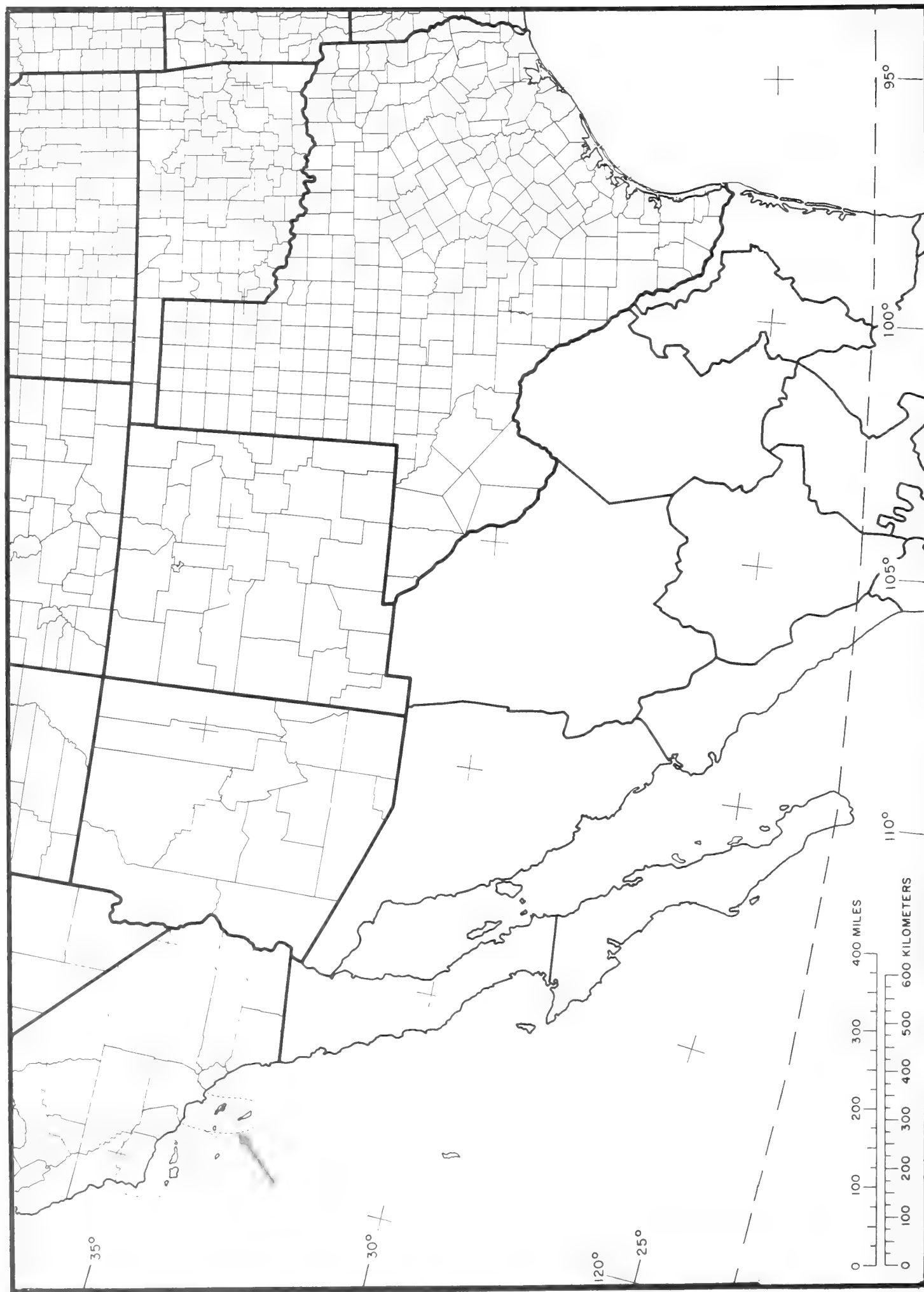
Map 40. *Cercocarpus betuloides* Nutt., birchleaf cercocarpus.



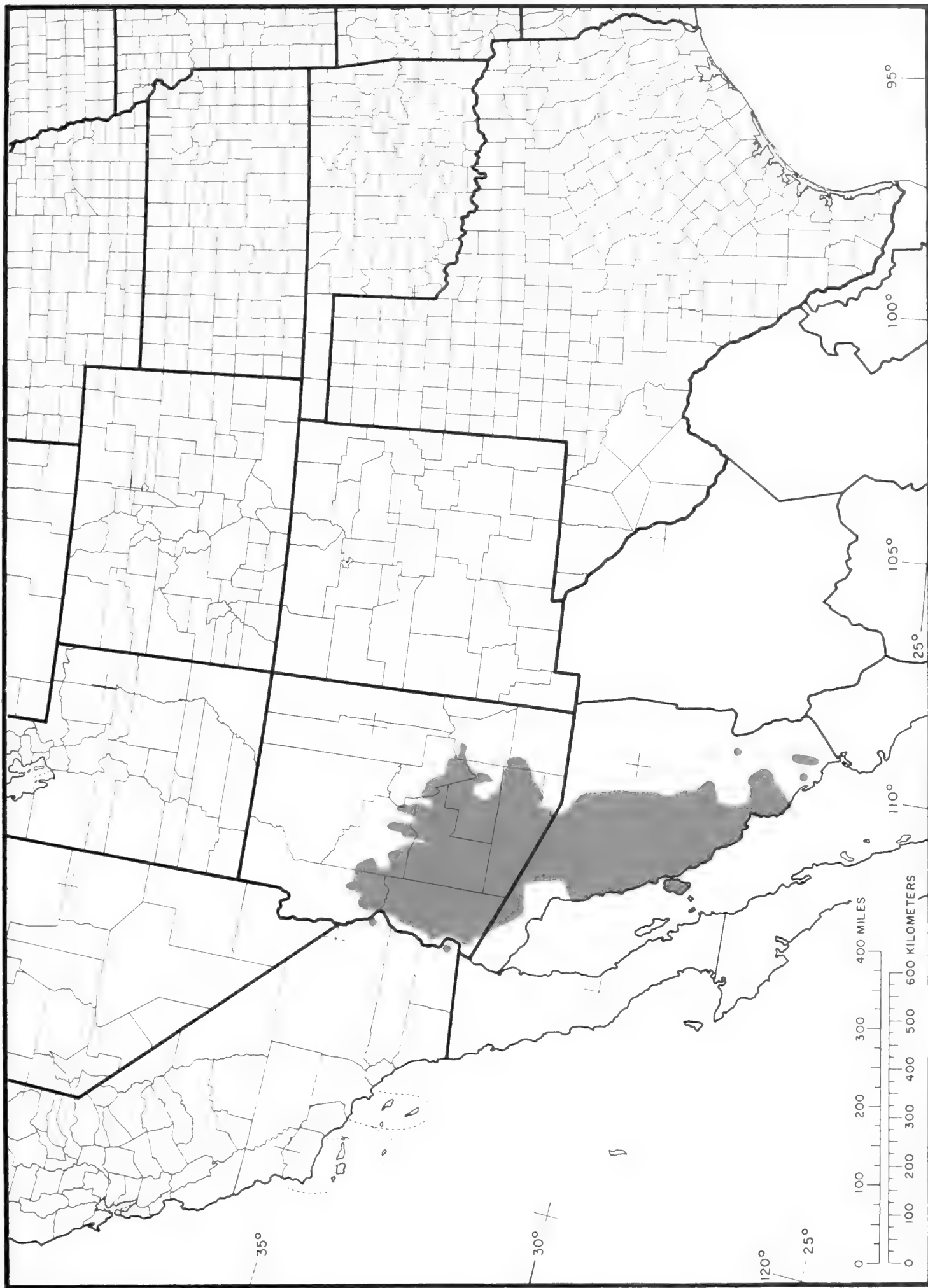
Map 41. *Cercocarpus breviflorus* A. Gray, hairy cercocarpus.



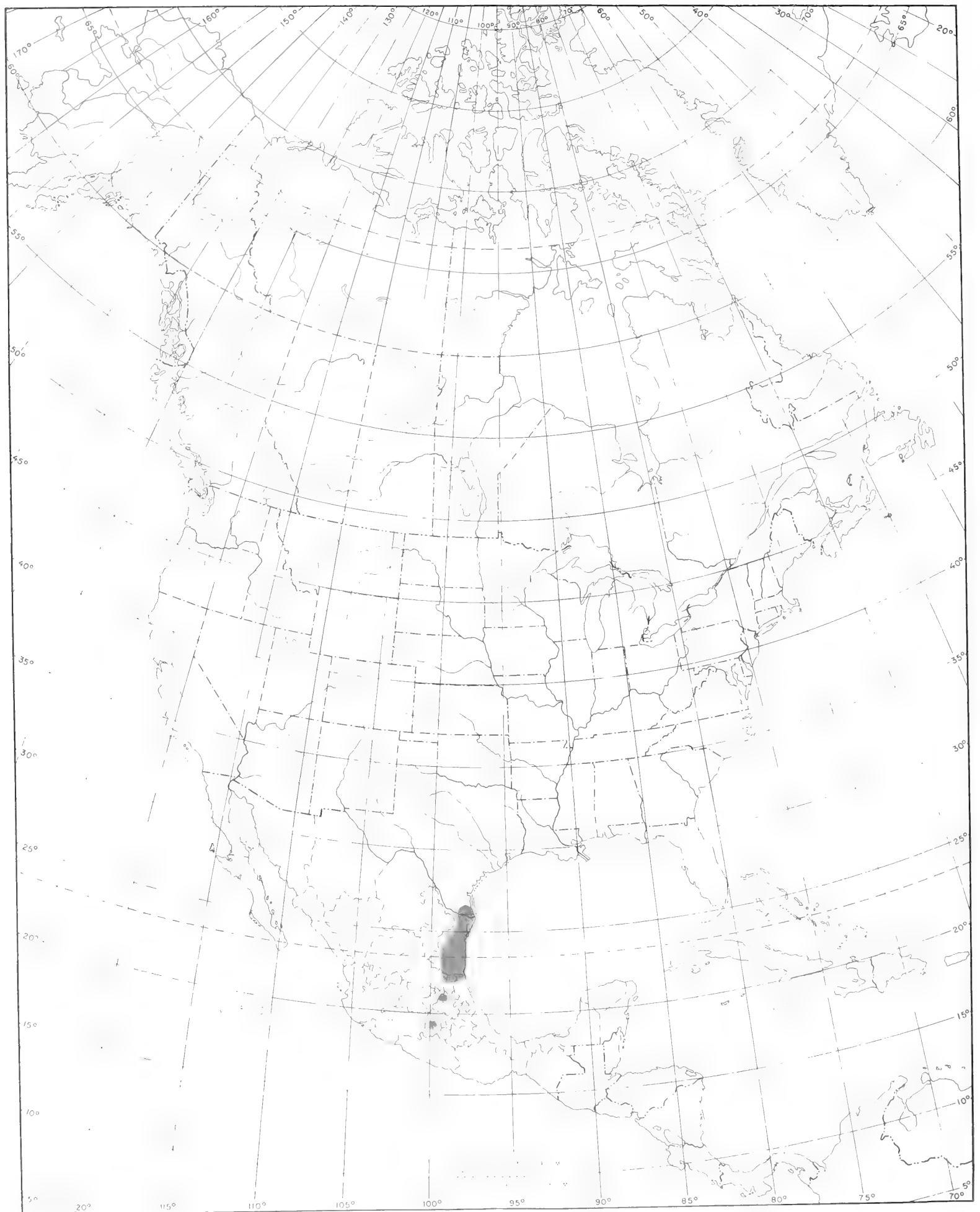
Map 12. *Cercocarpus ledifolius* Nutt., curleaf cercocarpus.



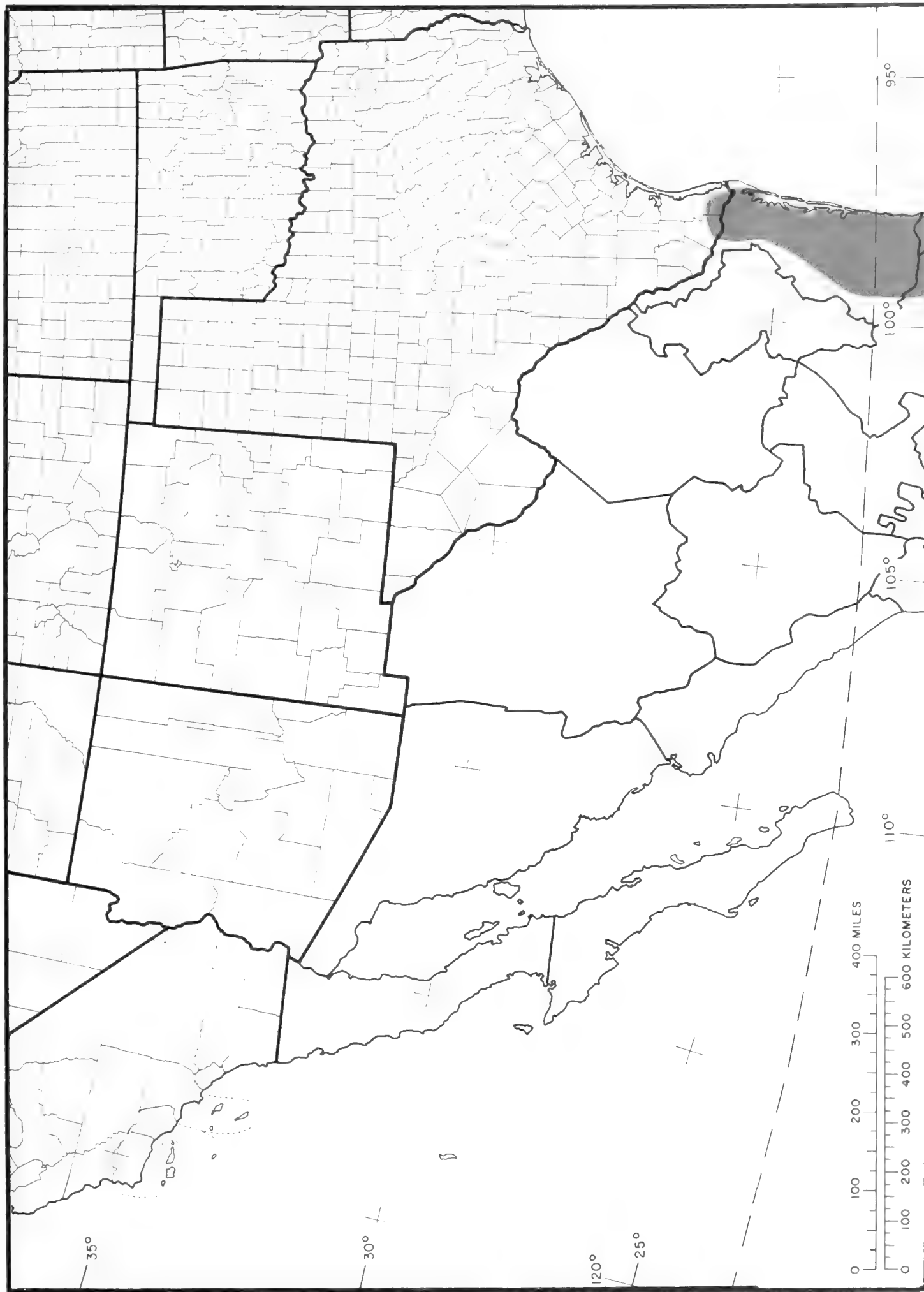
Map 43. *Cercocarpus traskiae* Eastw., *Catalina cercocarpus*. Santa Catalina Island of California only.



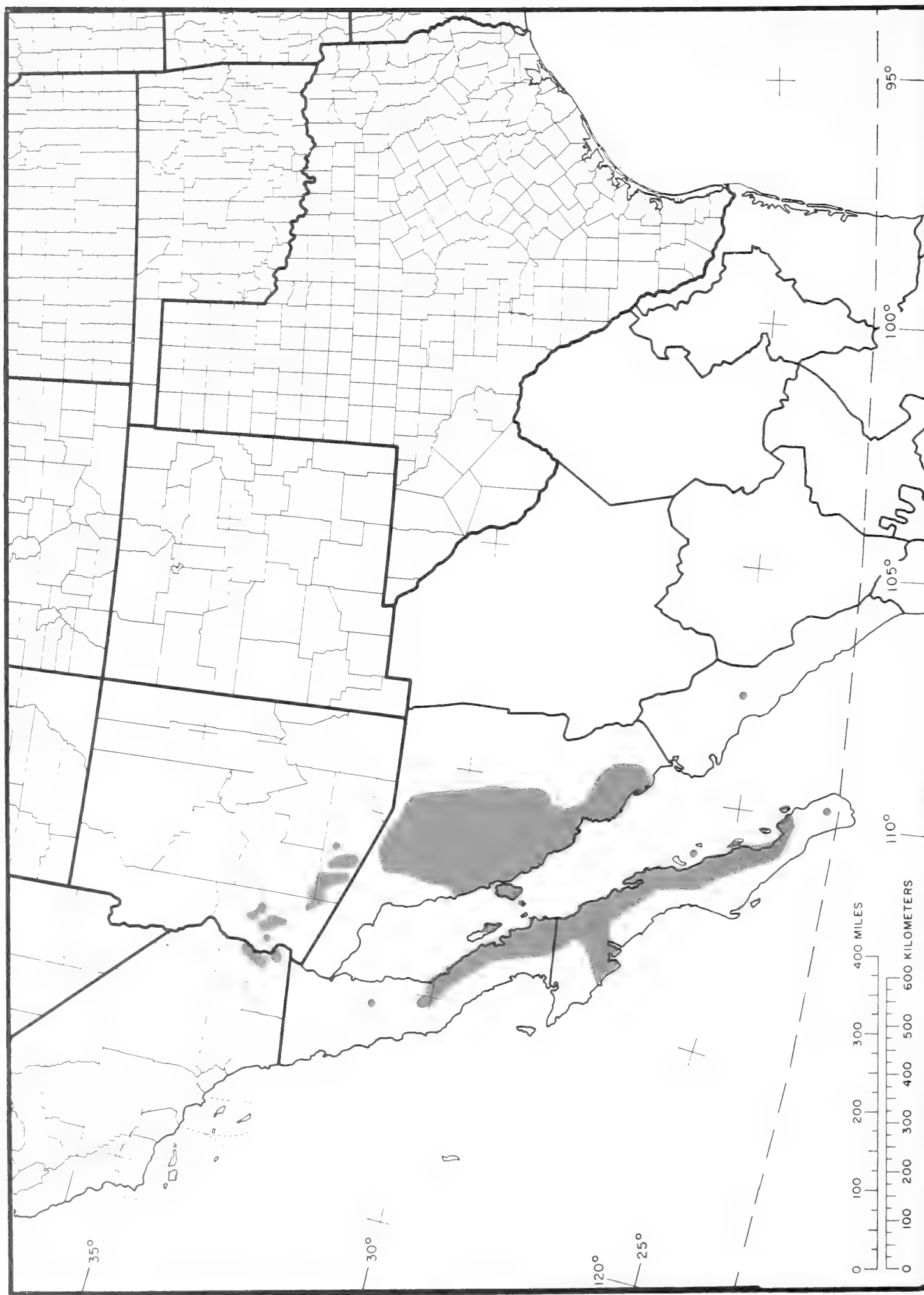
Map 44. *Cereus giganteus* Engelm., saguaro. Arizona, southeastern California (2 localities), and Sonora only.



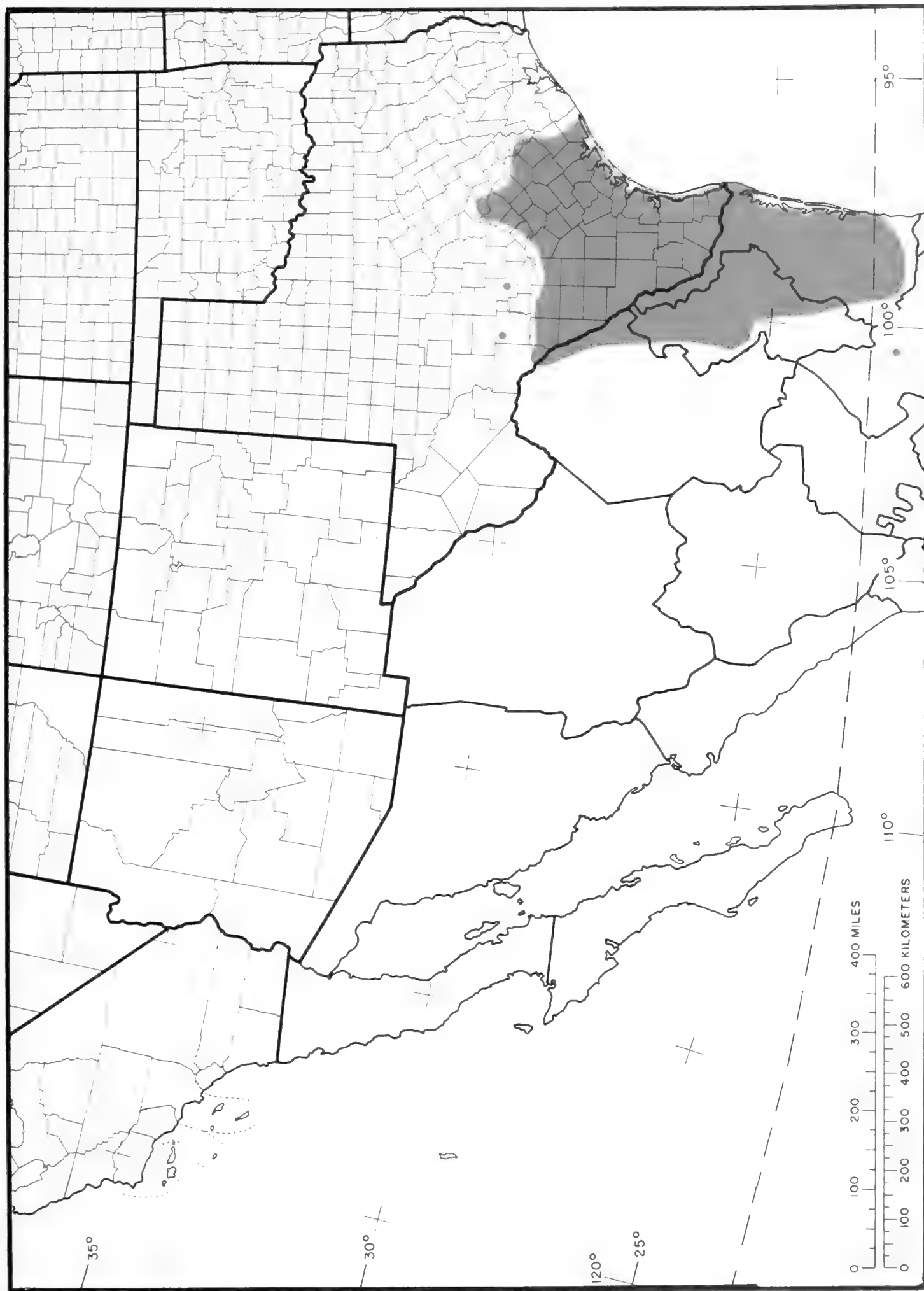
Map 45-N. *Citharexylum berlandieri* Robinson, Berlandier fiddlewood.



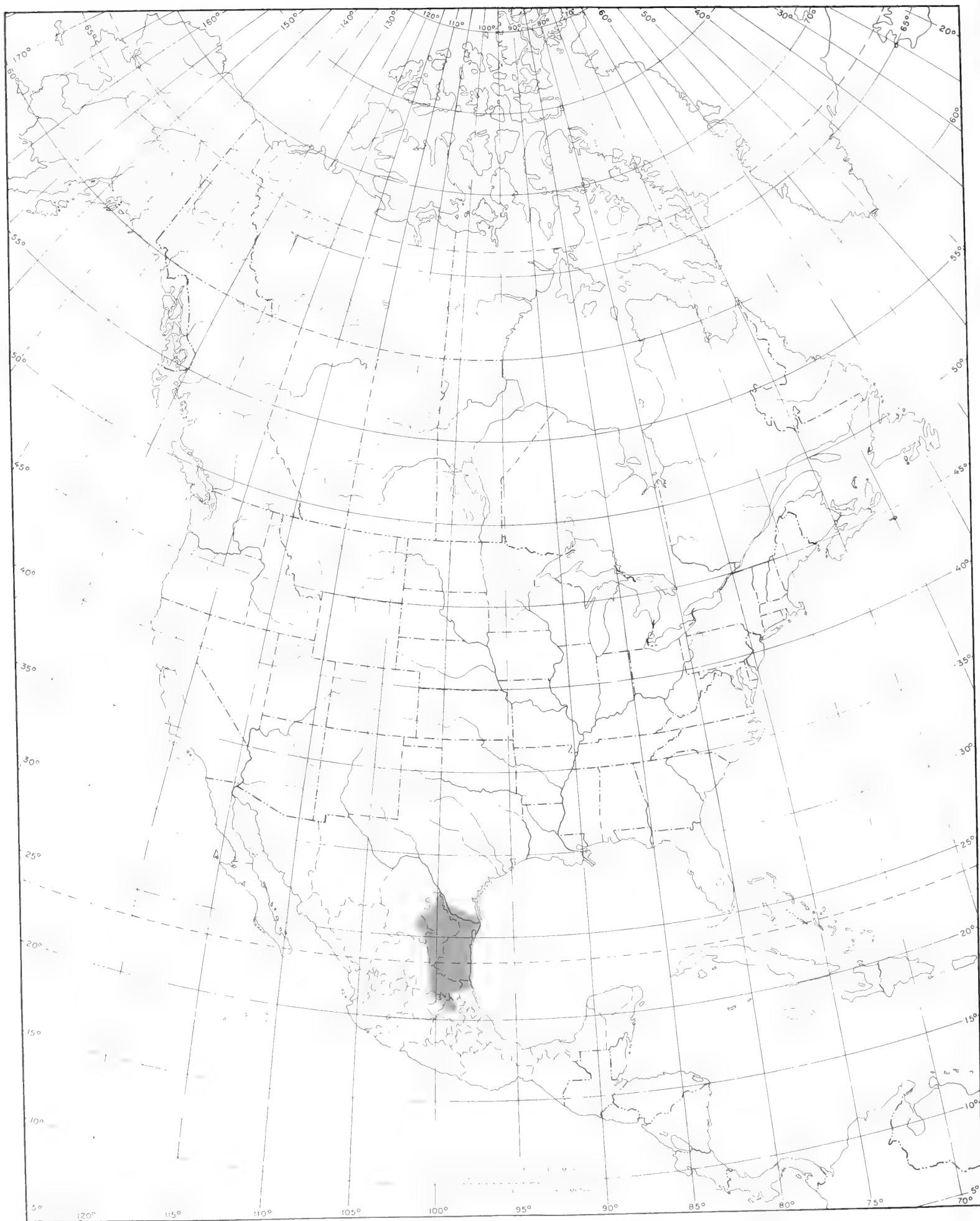
Map 45-SW. *Citharexylum berlandieri* Robinson, Berlandier fiddlewood. Extreme southern Texas and Mexico.



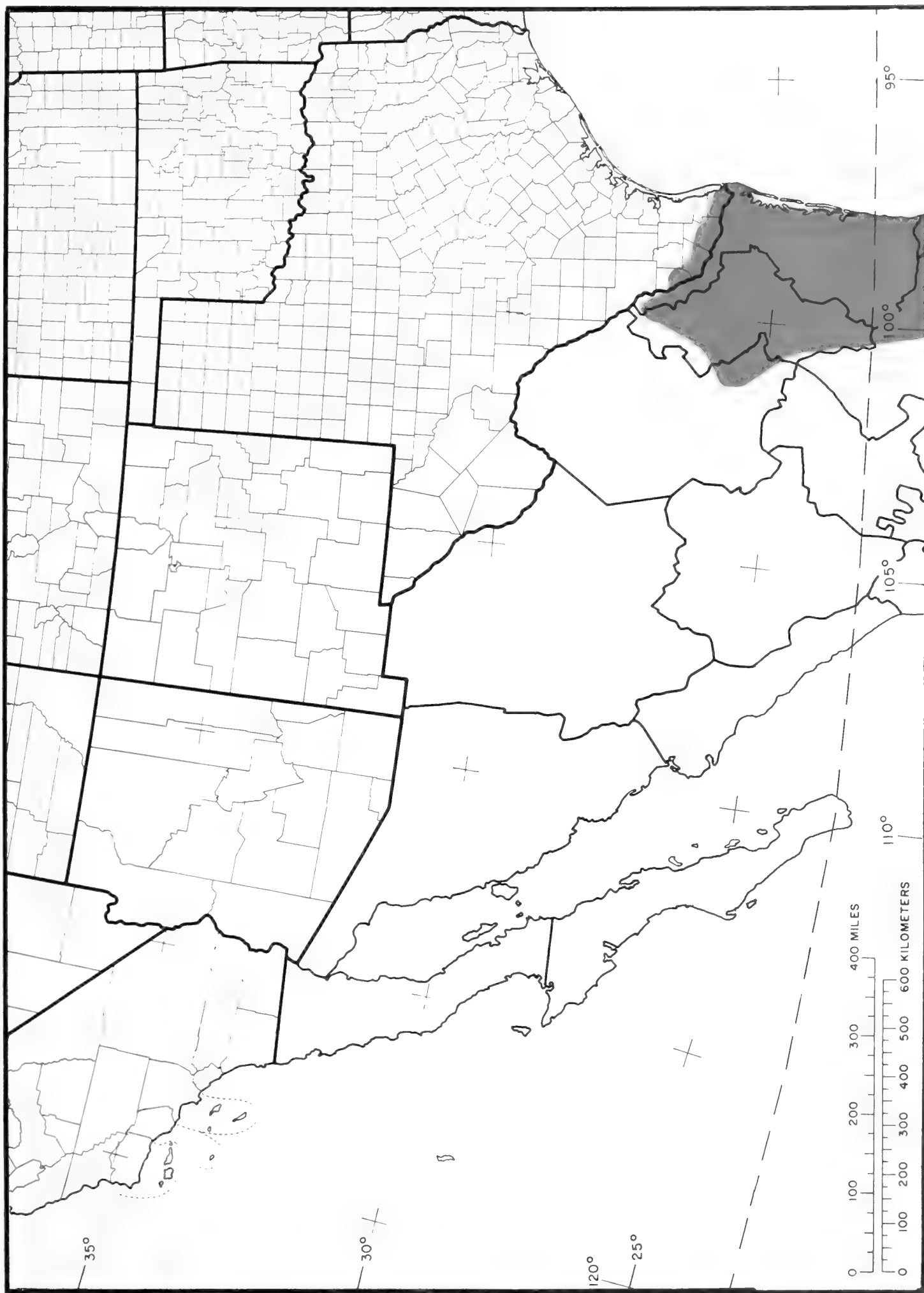
Map 46. *Condalia globosa* Johnstonii, bitter condalia. Southwestern Arizona, southeastern California, and northwestern Mexico.



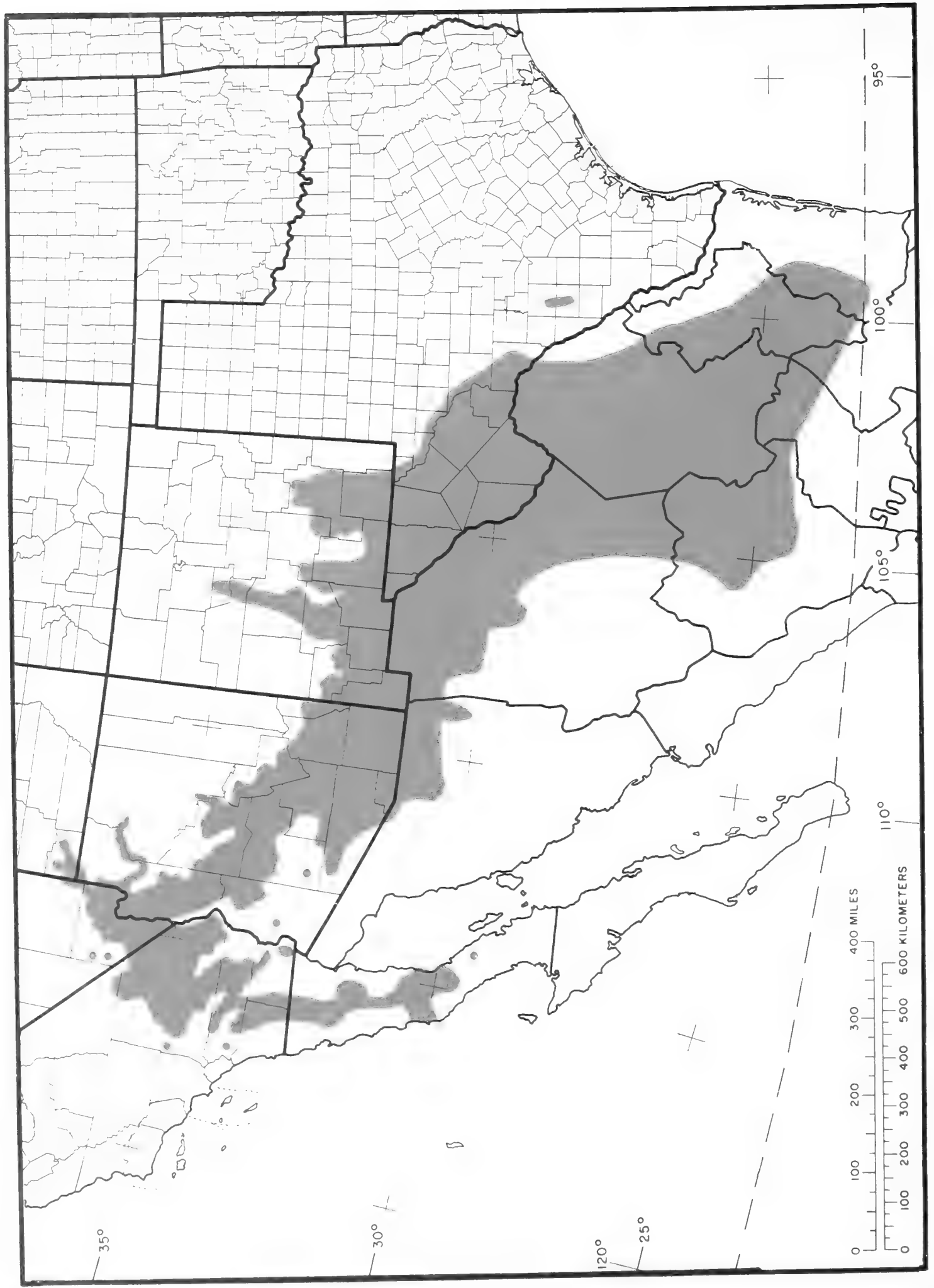
Map 47. *Condalia hookeri* M. C. Johnston, bluewood.



Map 18-N. *Cordia boissieri* A. DC., anacahuita.



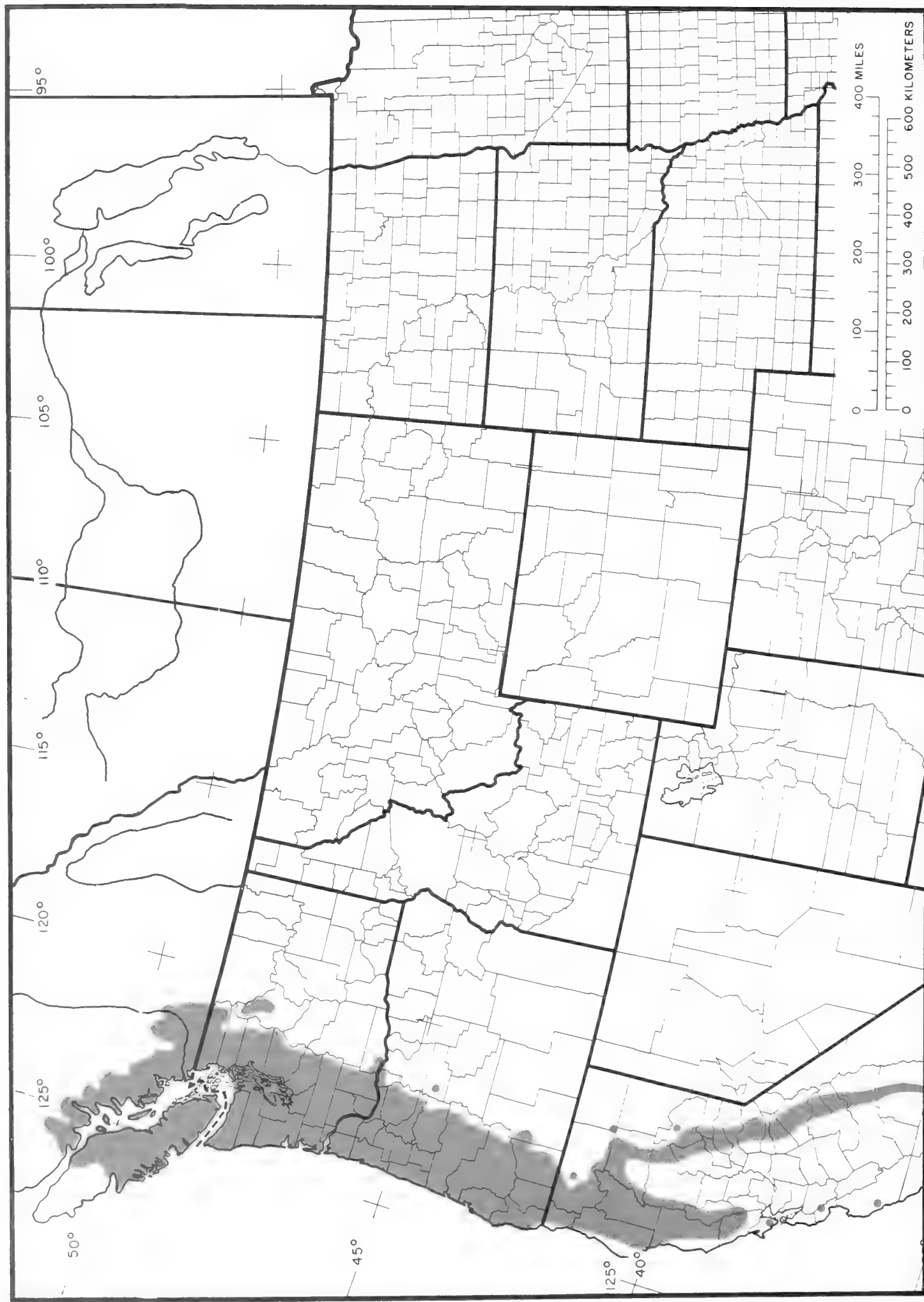
Map 48-SW. *Cordia boissieri* A. D.C., anacahuita. Extreme southern Texas and Mexico.



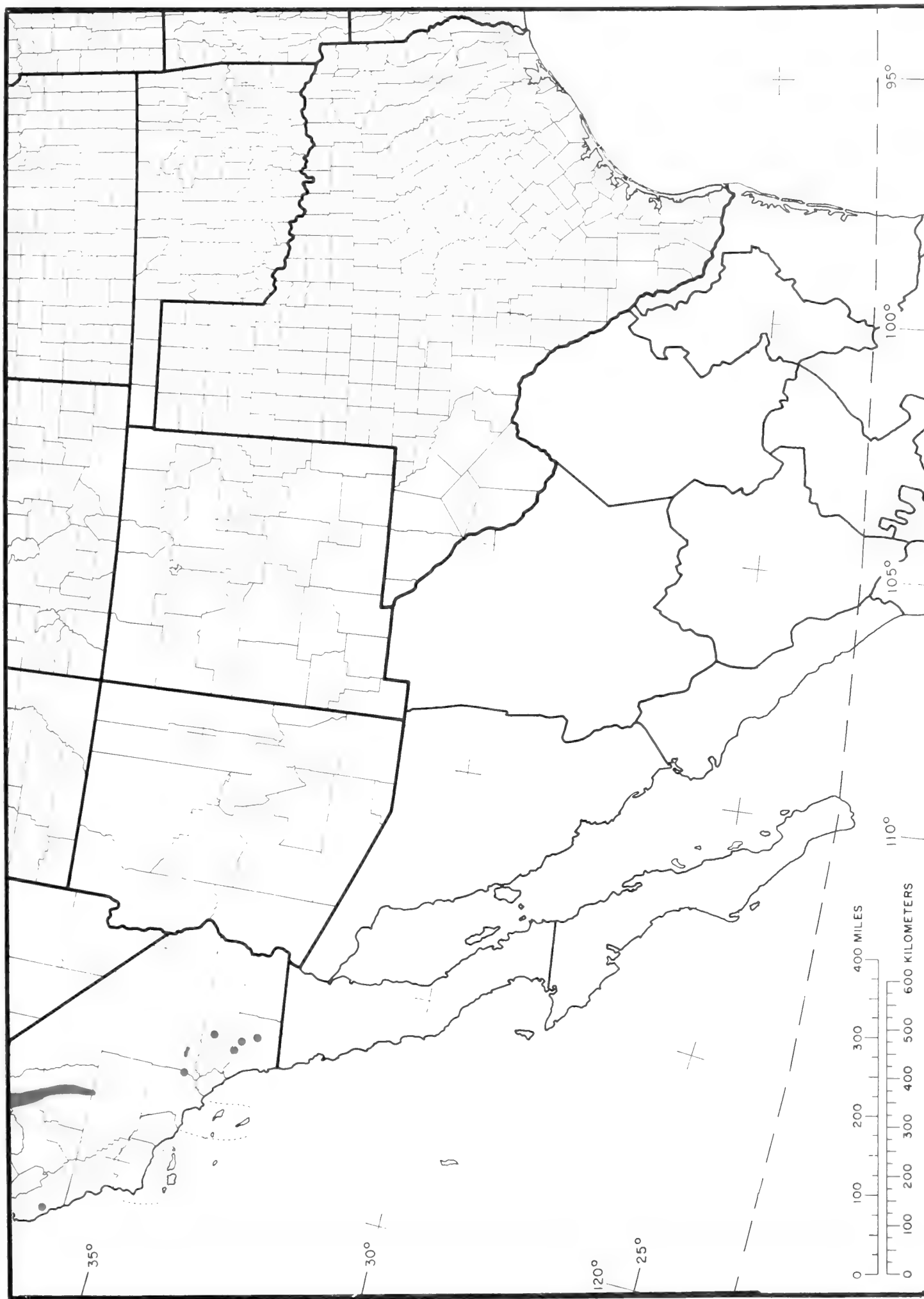
Map 49. *Chilopsis linearis* (Cav.) Sweet, desert-willow.



Map 50. *Cornus glabrata* Benth., brown dogwood.



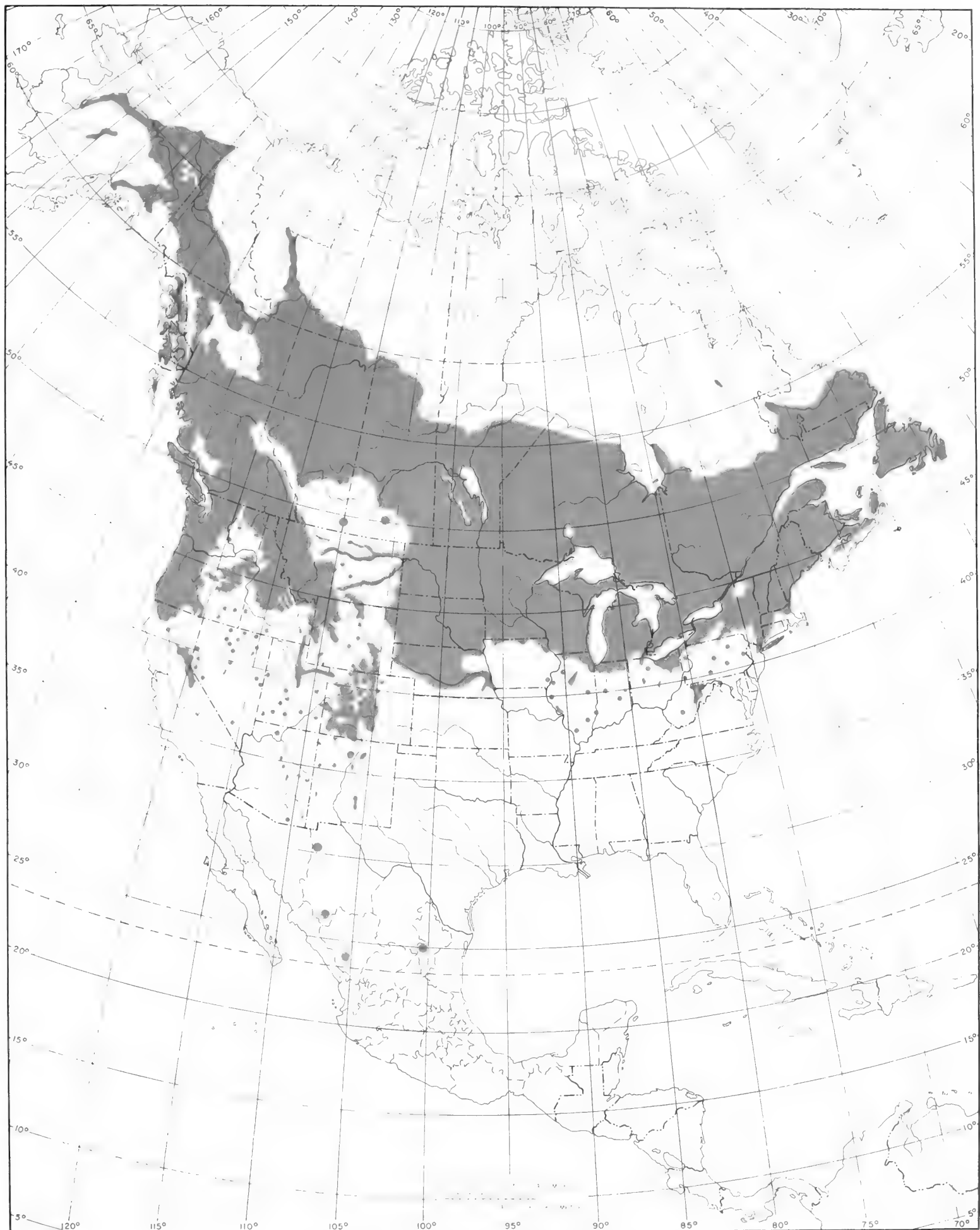
Map 51-NW. *Cornus nuttallii* Audubon, Pacific dogwood, northern range.



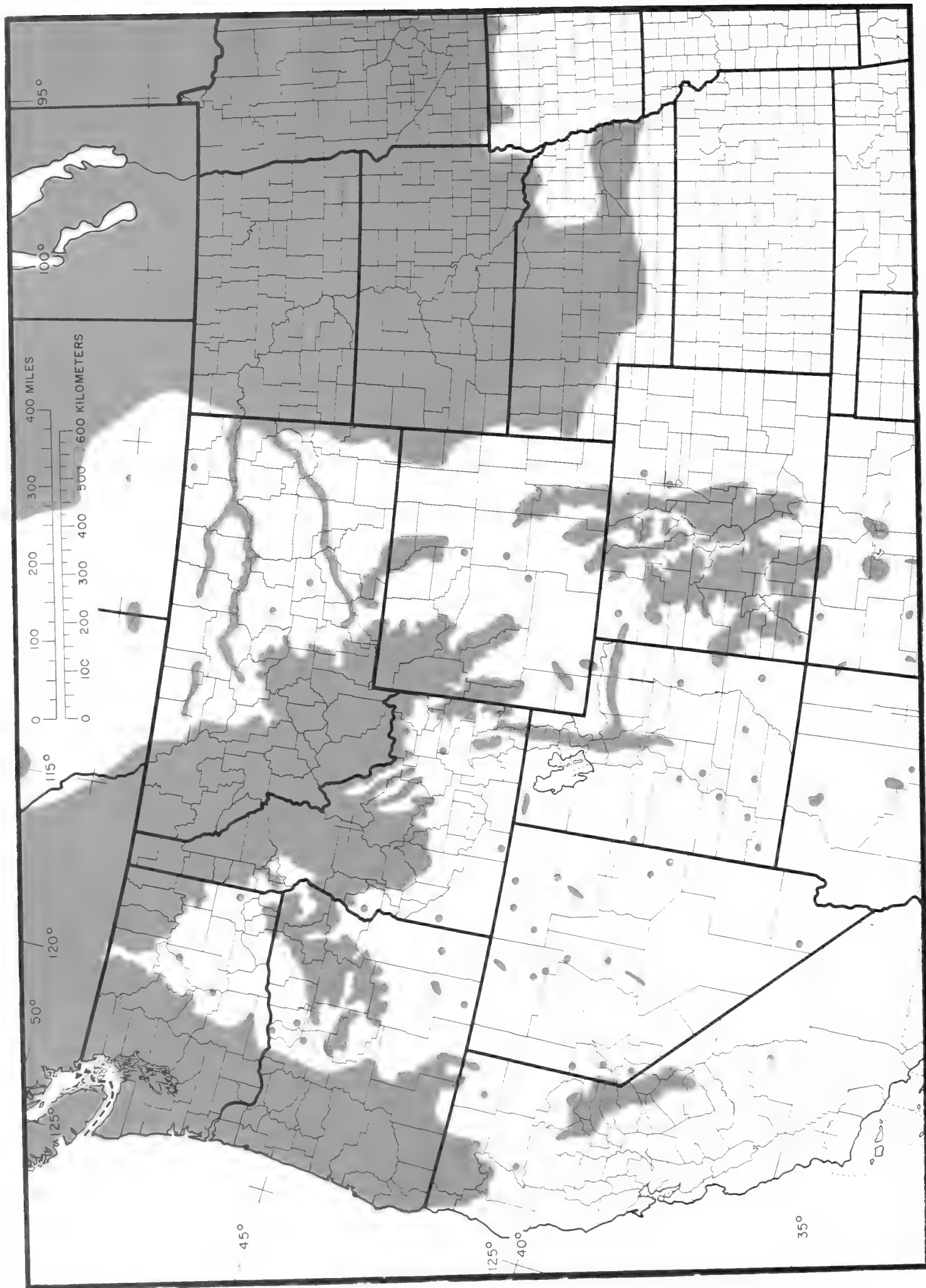
Map 51-SW. *Cornus nuttallii* Audubon, Pacific dogwood, southern range.



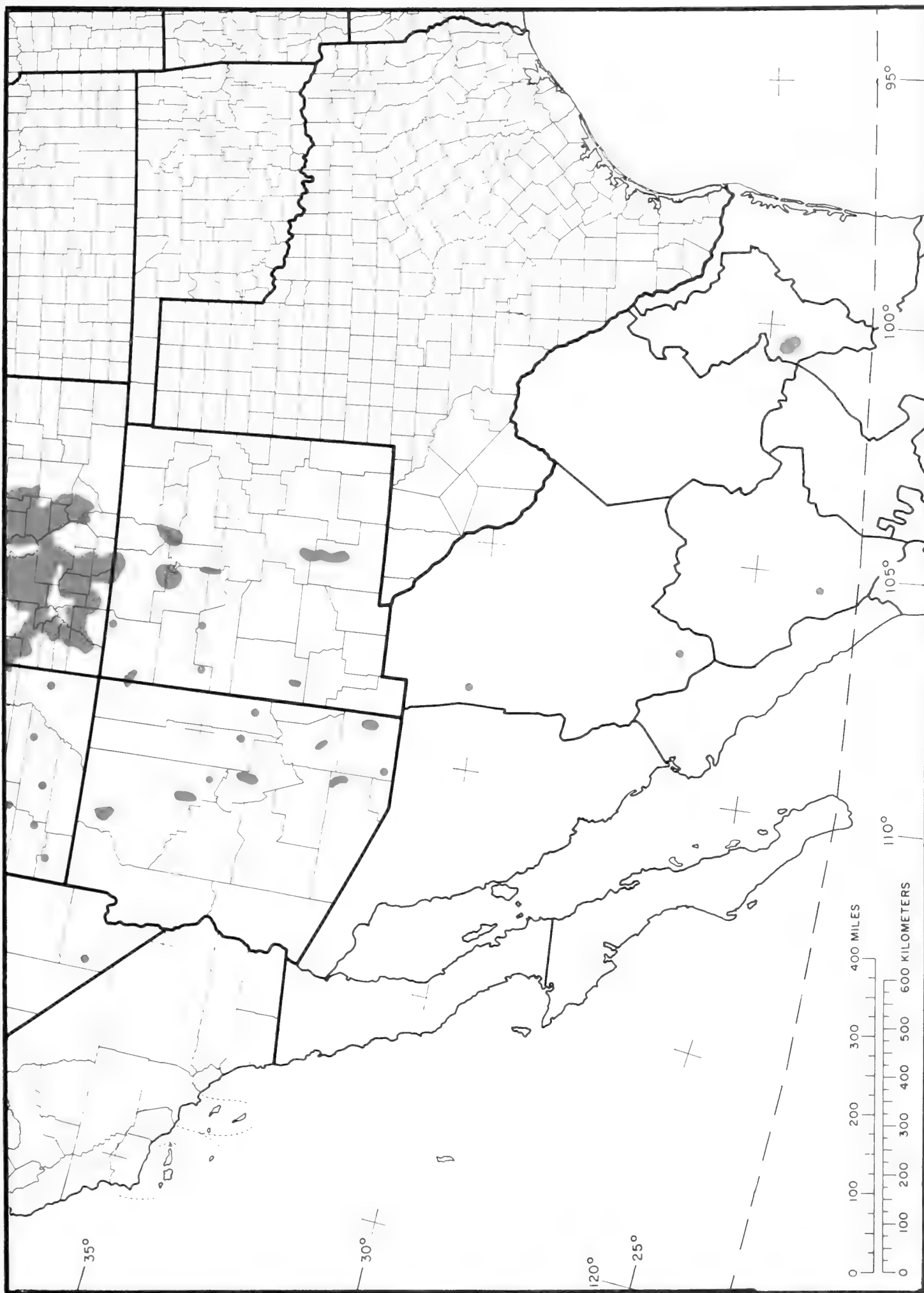
Map 52. *Cornus occidentalis* (Torr. & Gray) Coville, western dogwood.



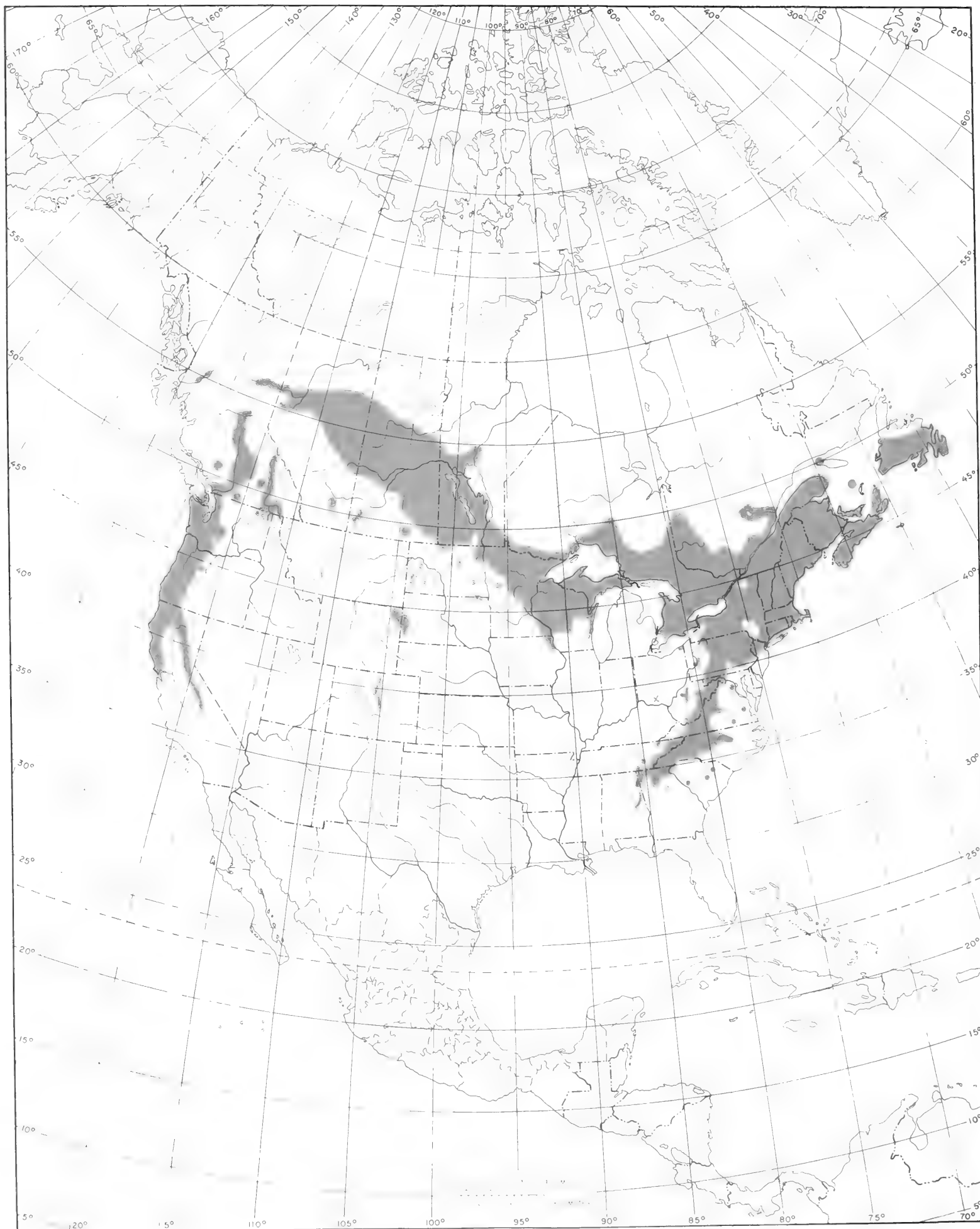
Map 53-N. *Cornus stolonifera* Michx., red-osier dogwood.



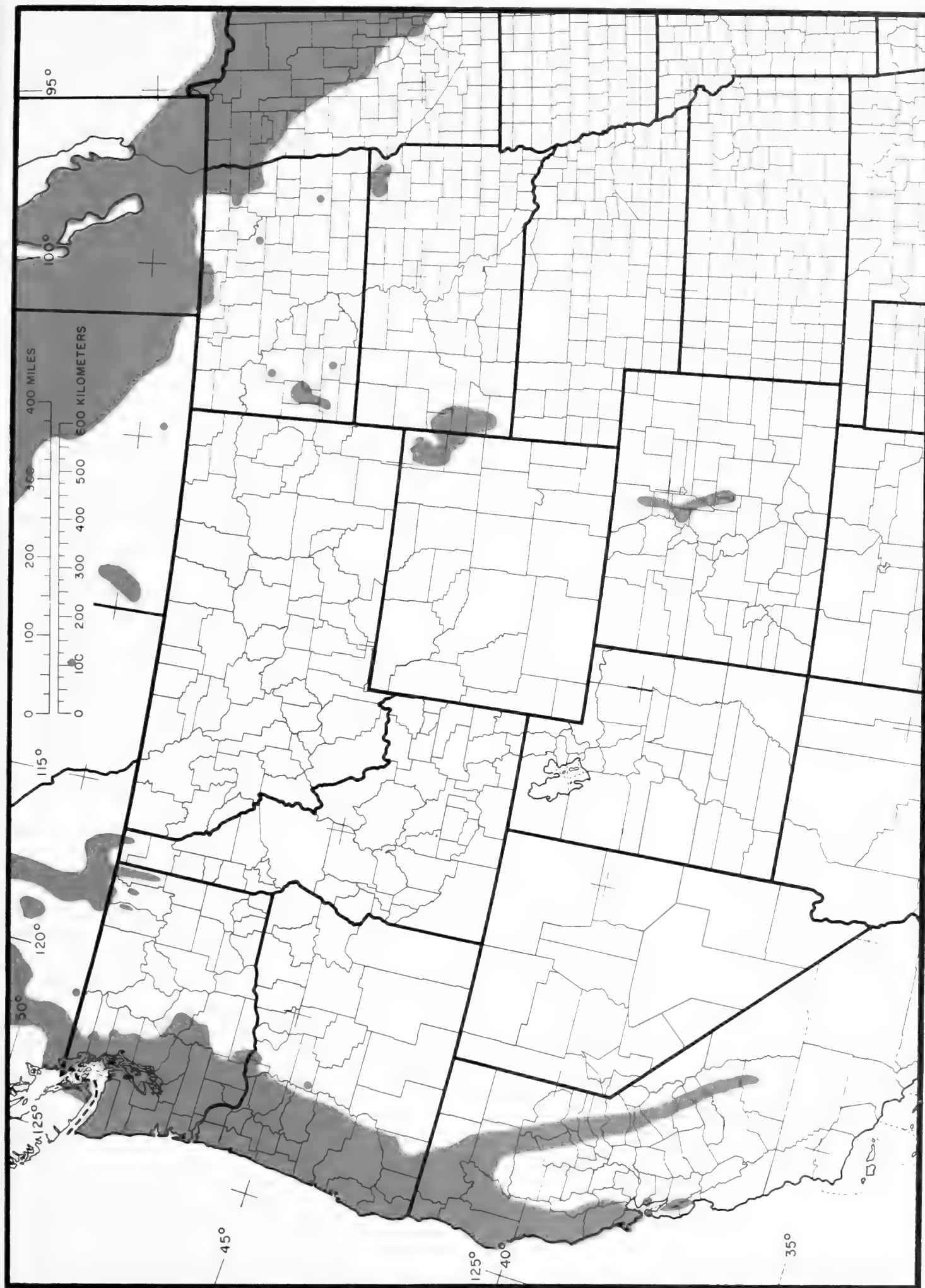
Map 53-NW. *Cornus stolonifera* Michx., red-osier dogwood.



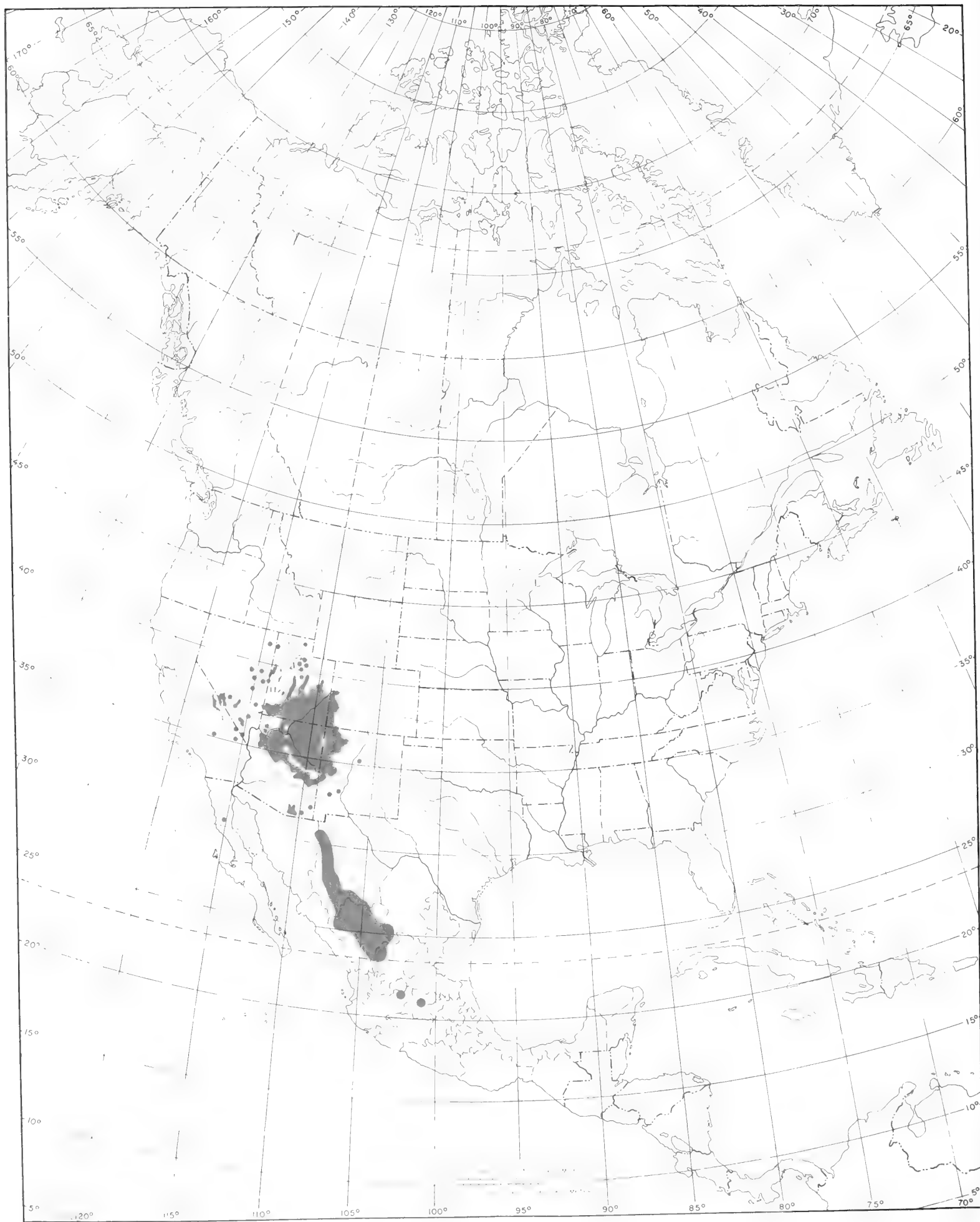
Map 53-SW. *Cornus stolonijera* Michx., red-osier dogwood.



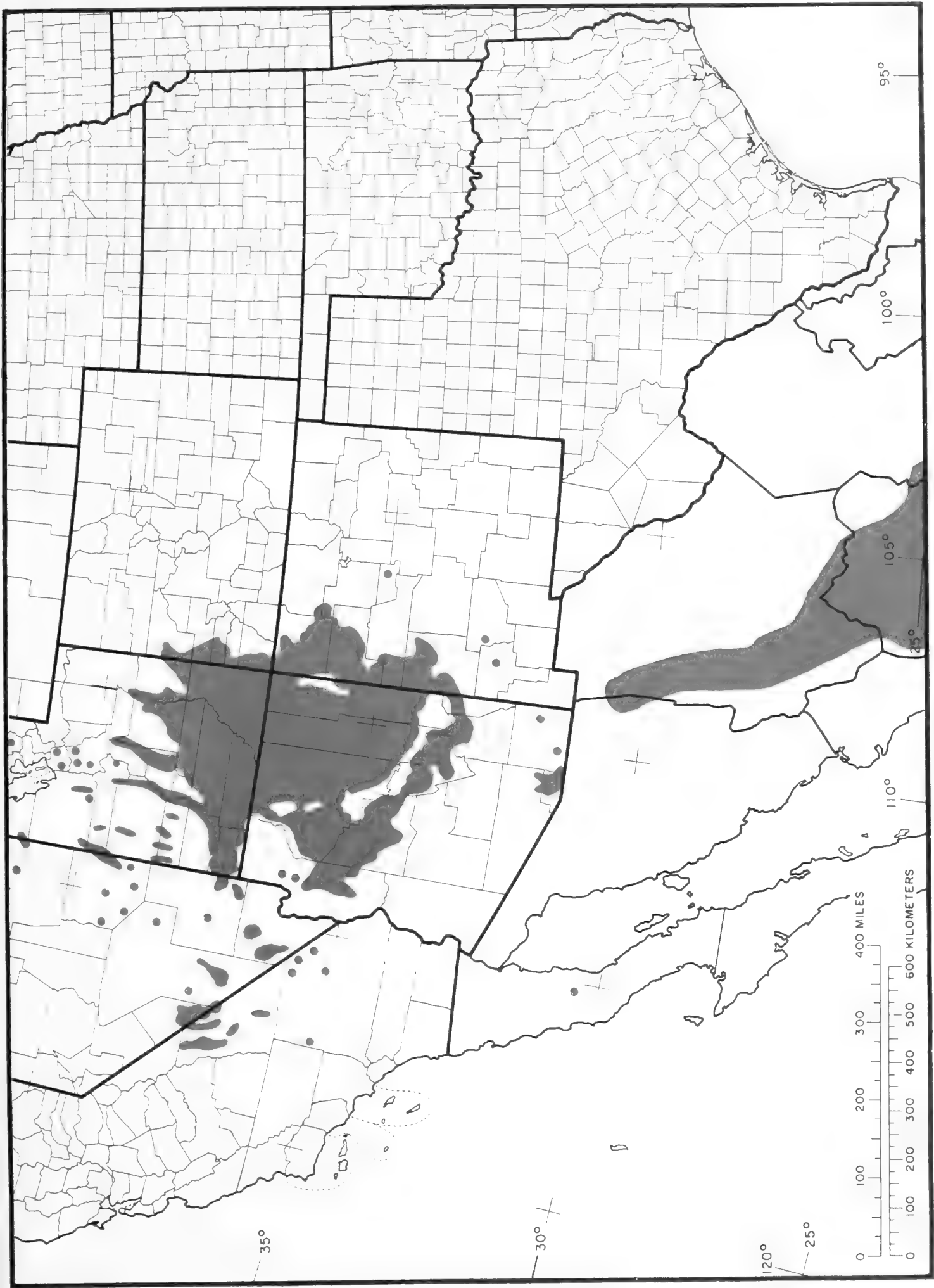
Map 54-N. *Corylus cornuta* Marsh., beaked hazel.



Map 54-NW. *Corylus cornuta* Marsh., beaked hazel. Eastern range in Volume 4.



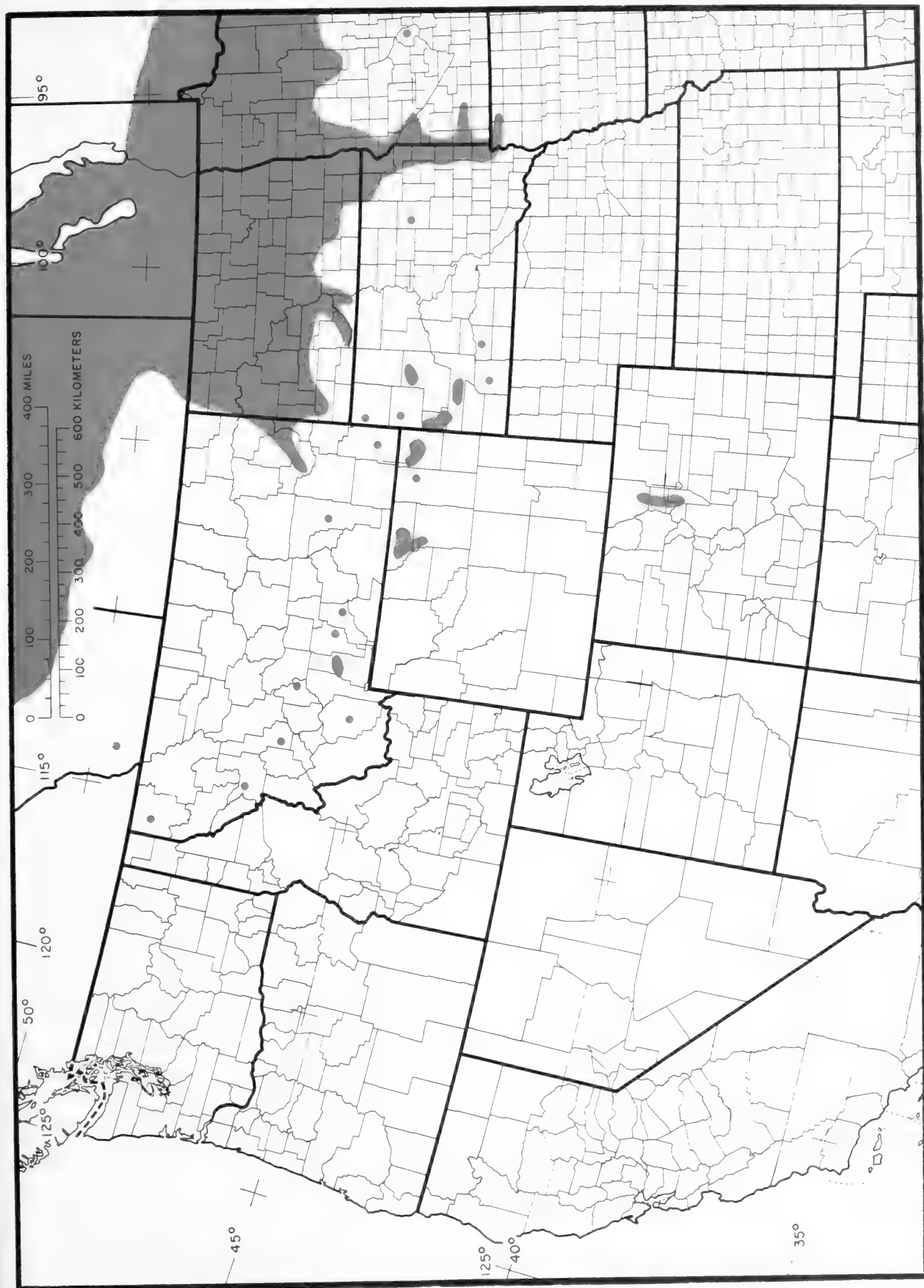
Map 55-N. *Cowania mexicana* D. Don, cliffrose.



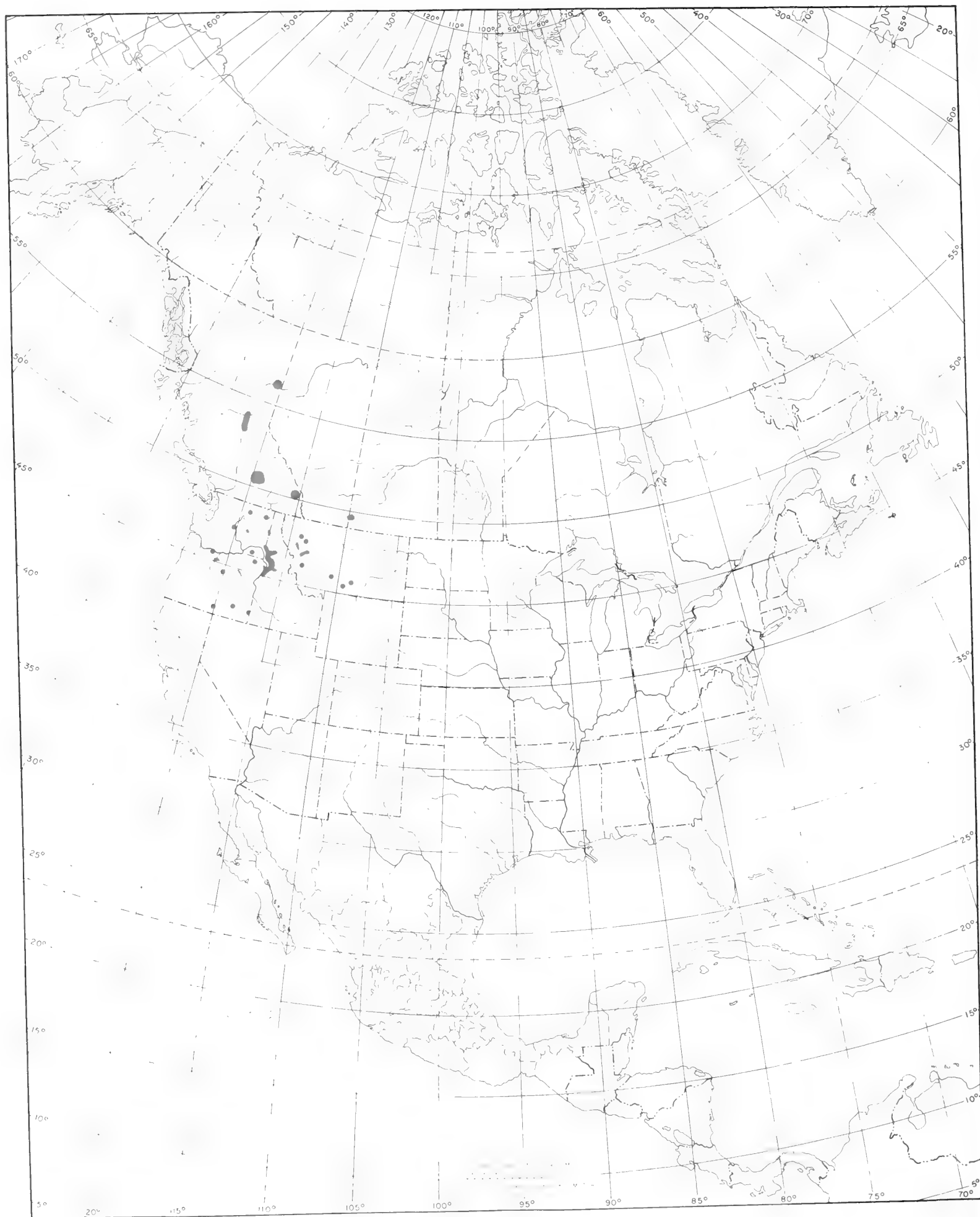
Map 55-SW. *Covania mexicana* D. Don, cliffrose.



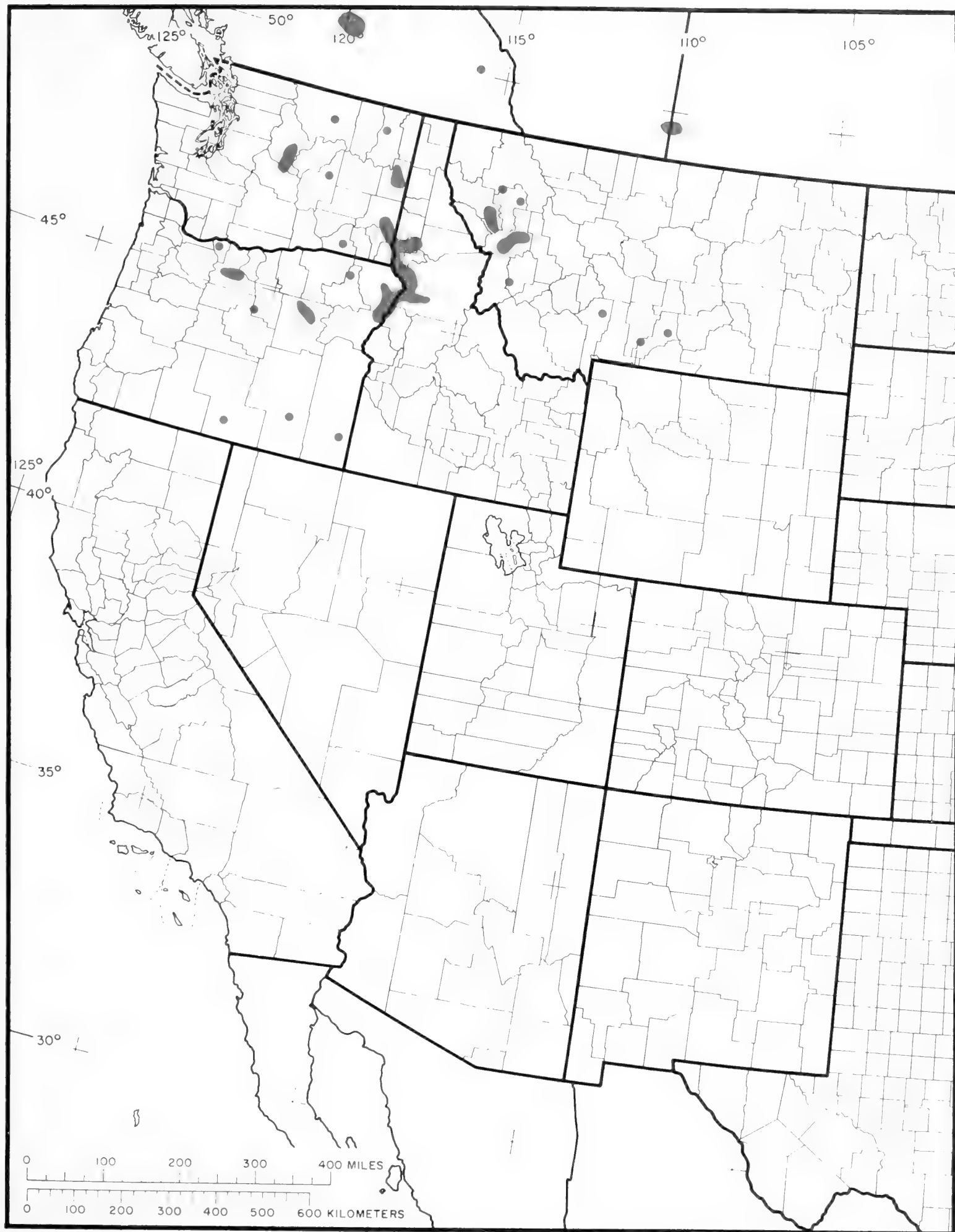
Map 56. *Cornus sessilis* Torr., blackfruit dogwood. Northern California only.



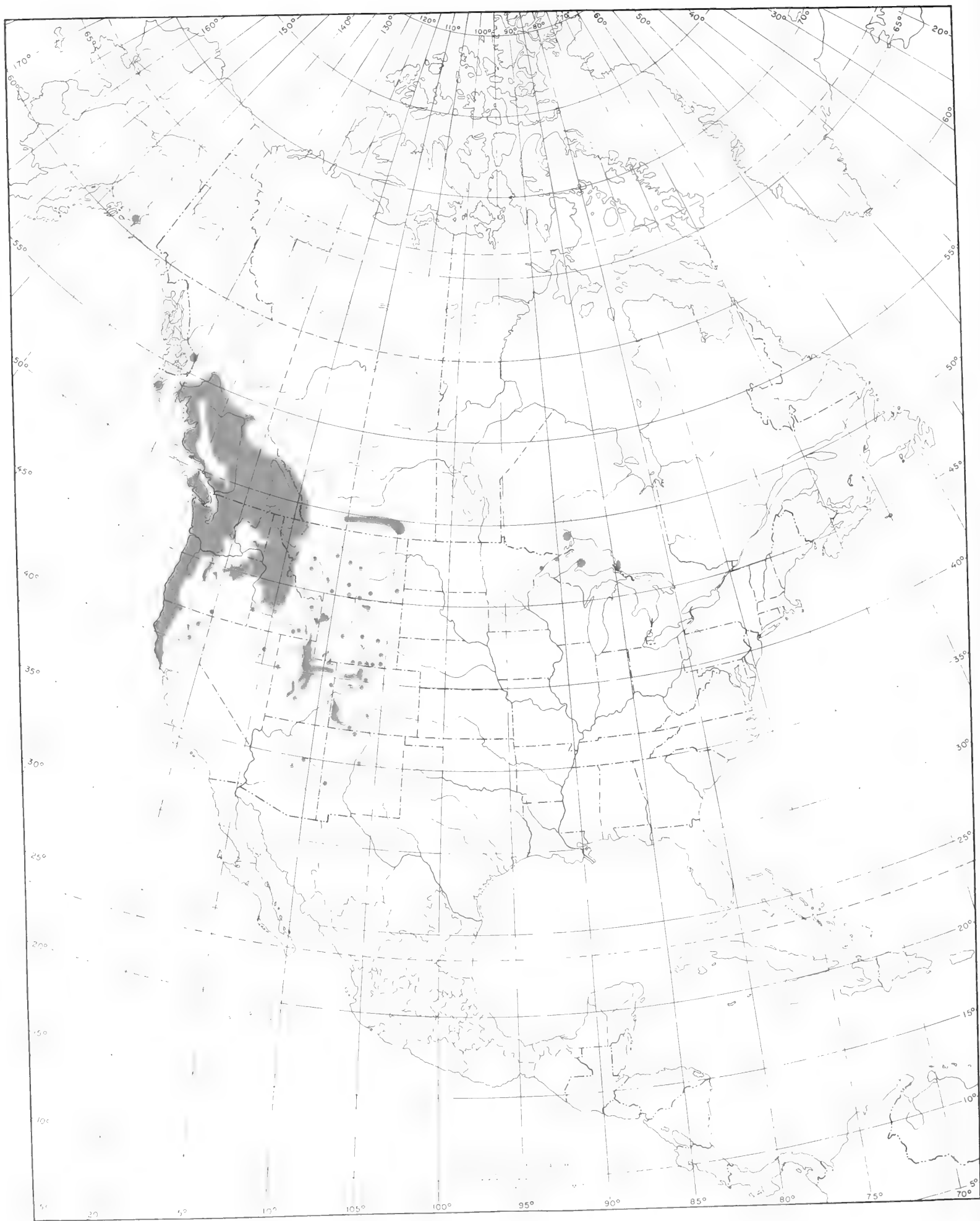
Map 57. *Crataegus chrysocarpa* Ashe, fireberry hawthorn, western range. Also east to Quebec, Newfoundlnd, Maine, and New York (not mapped).



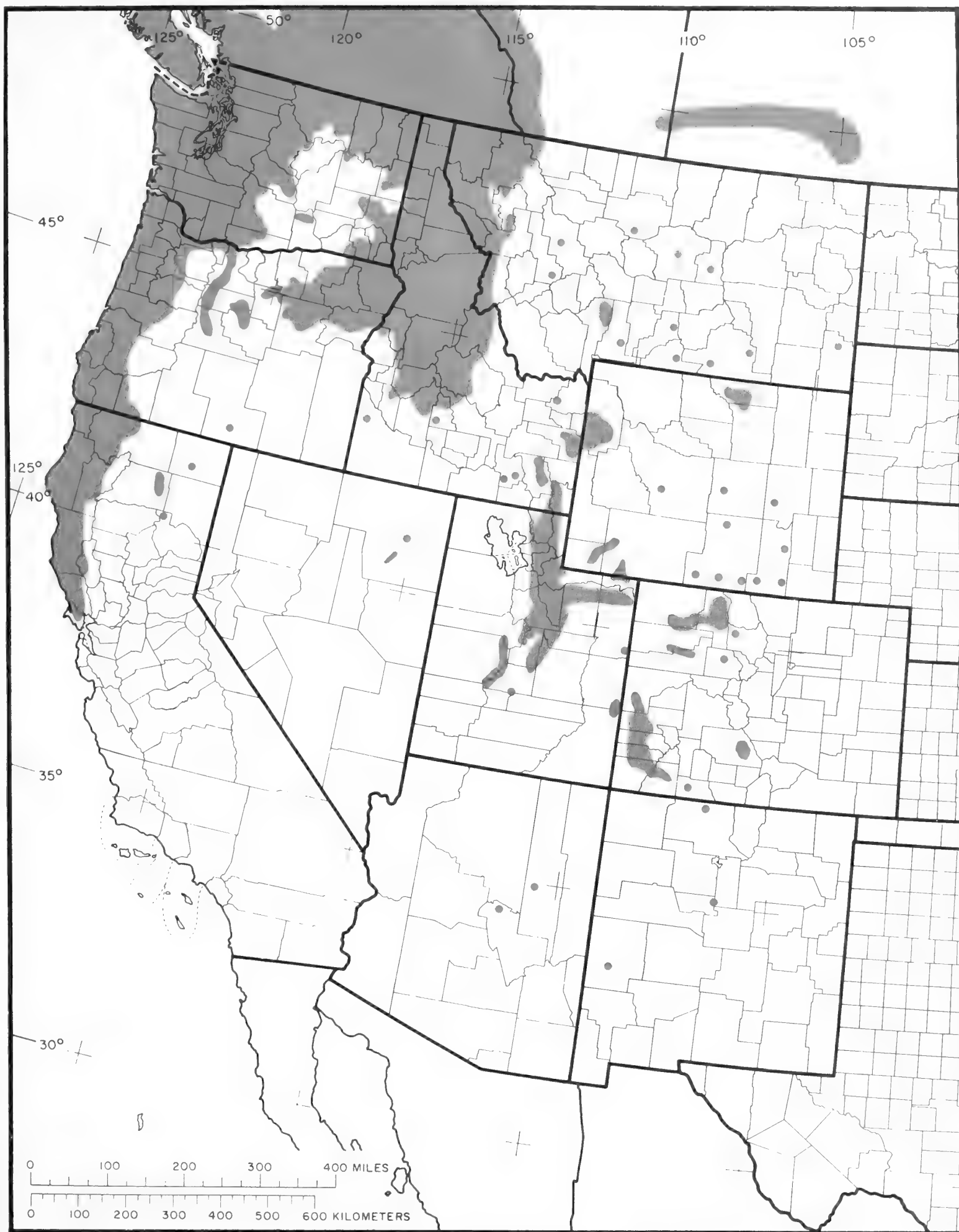
Map 58-N. *Crataegus columbiana* Howell, Columbia hawthorn.



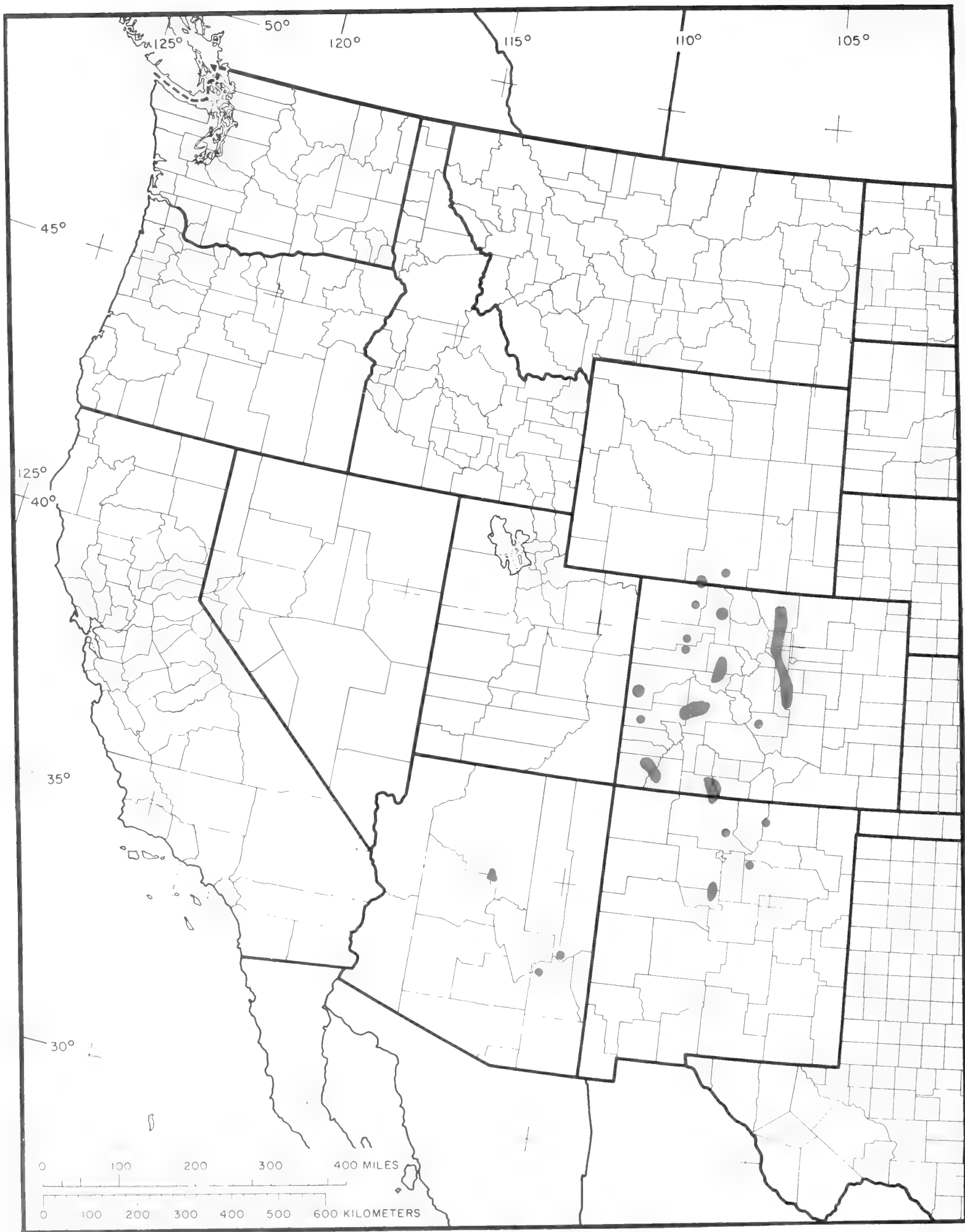
Map 58-NW. *Crataegus columbiana* Howell, Columbia hawthorn.



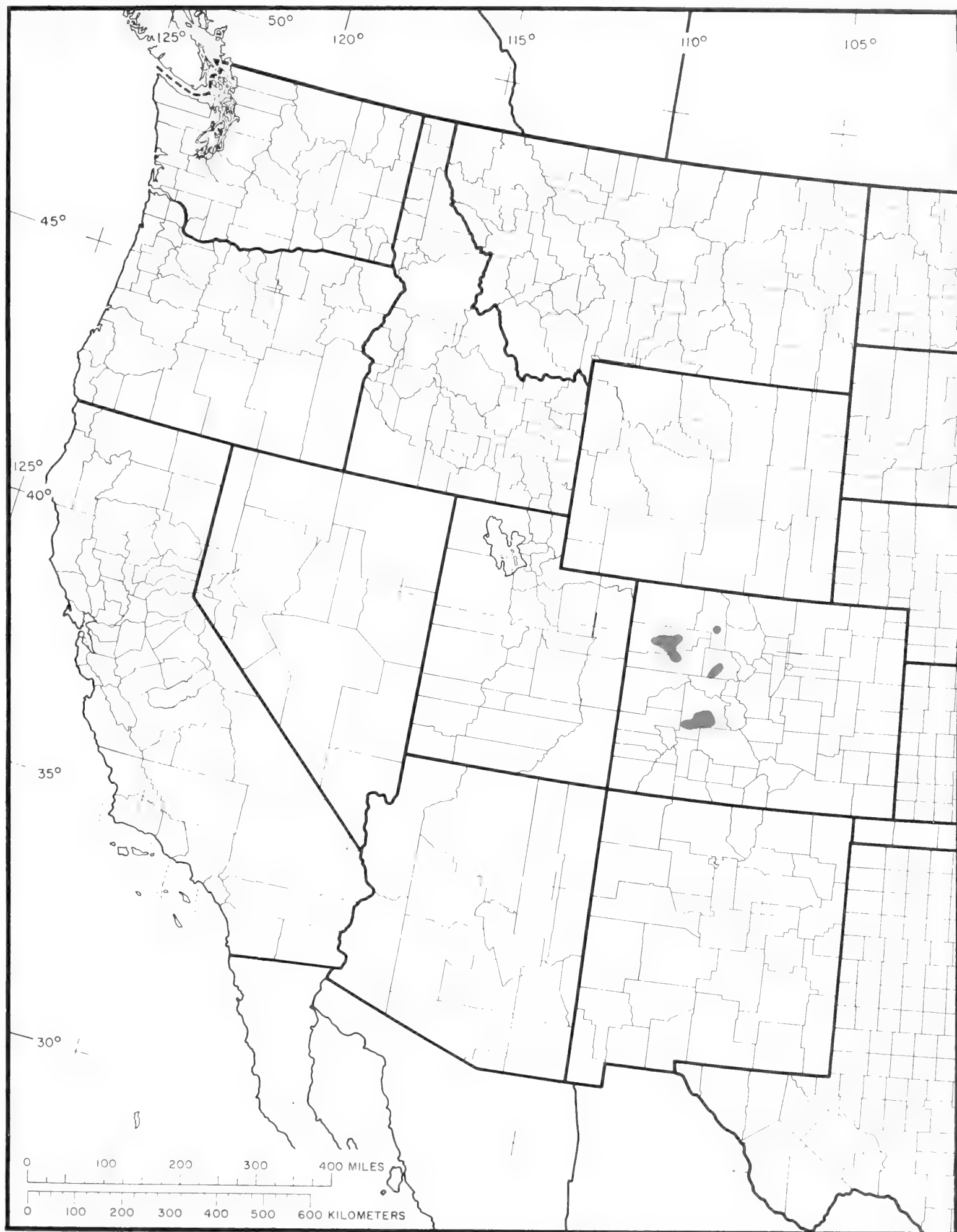
Map 59-N. *Crataegus douglasii* Lindl., black hawthorn.



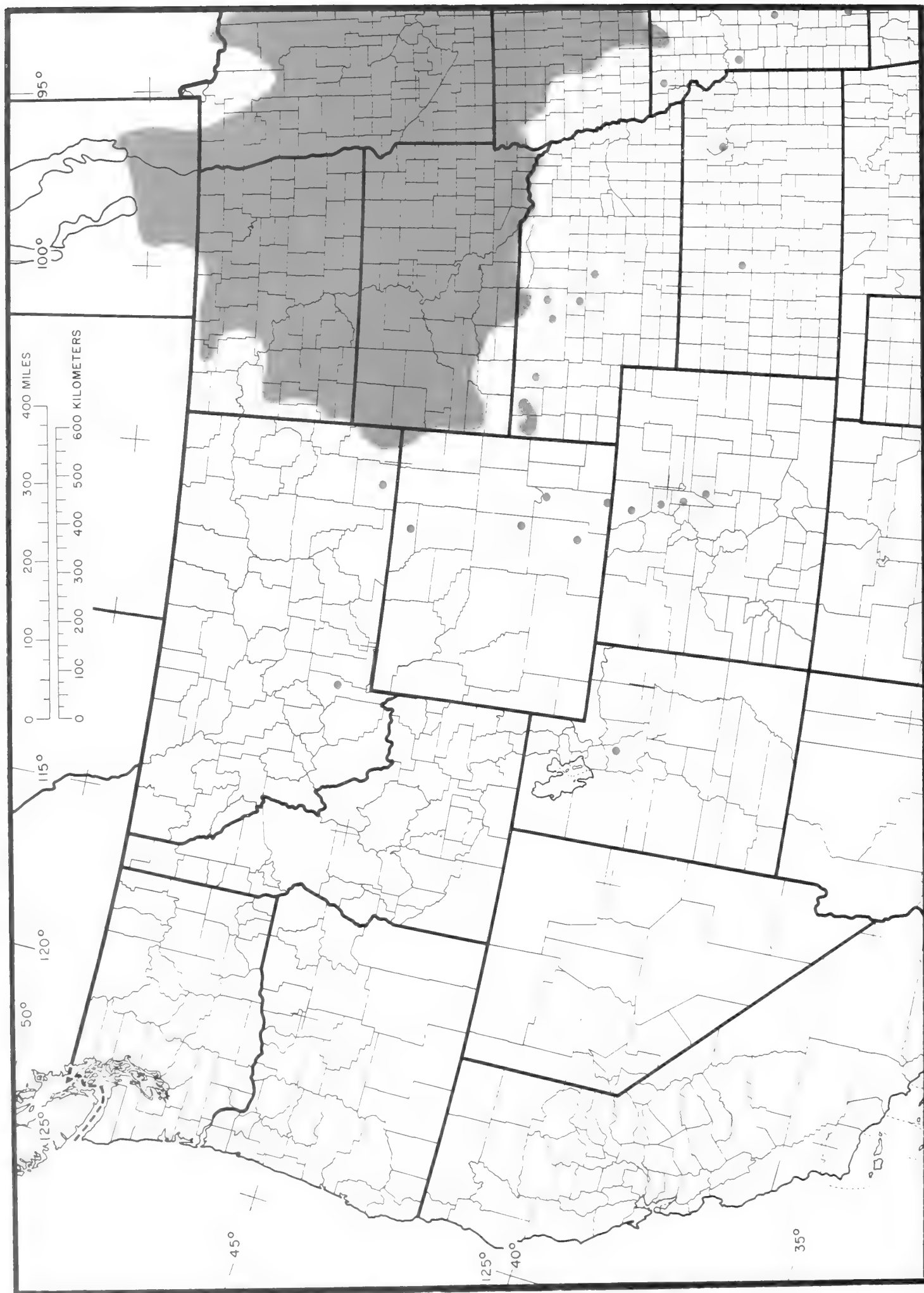
Map 59-NW. *Crataegus douglasii* Lindl., black hawthorn.



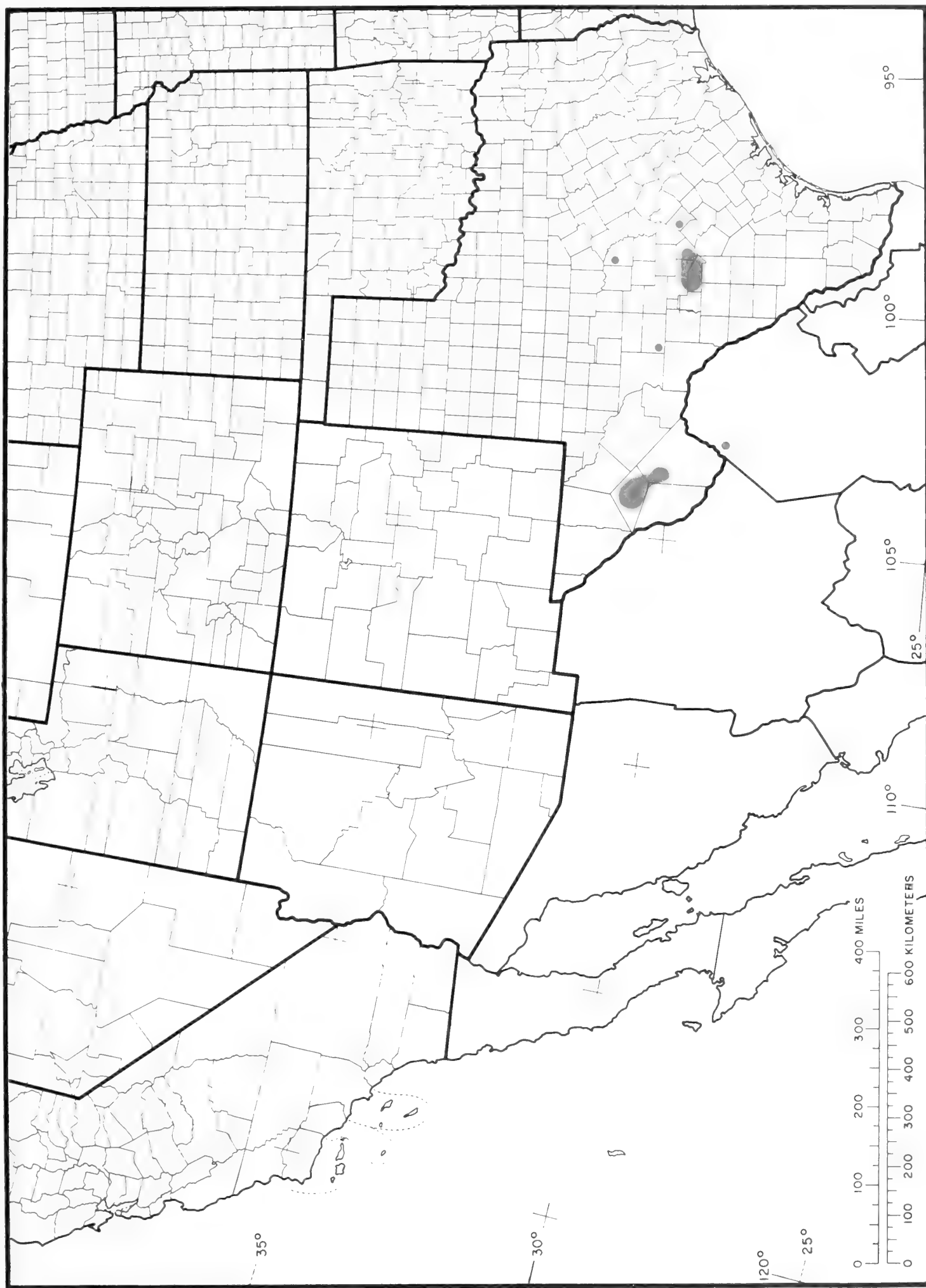
Map 60. *Crataegus erythropoda* Ashe. Cerro hawthorn.



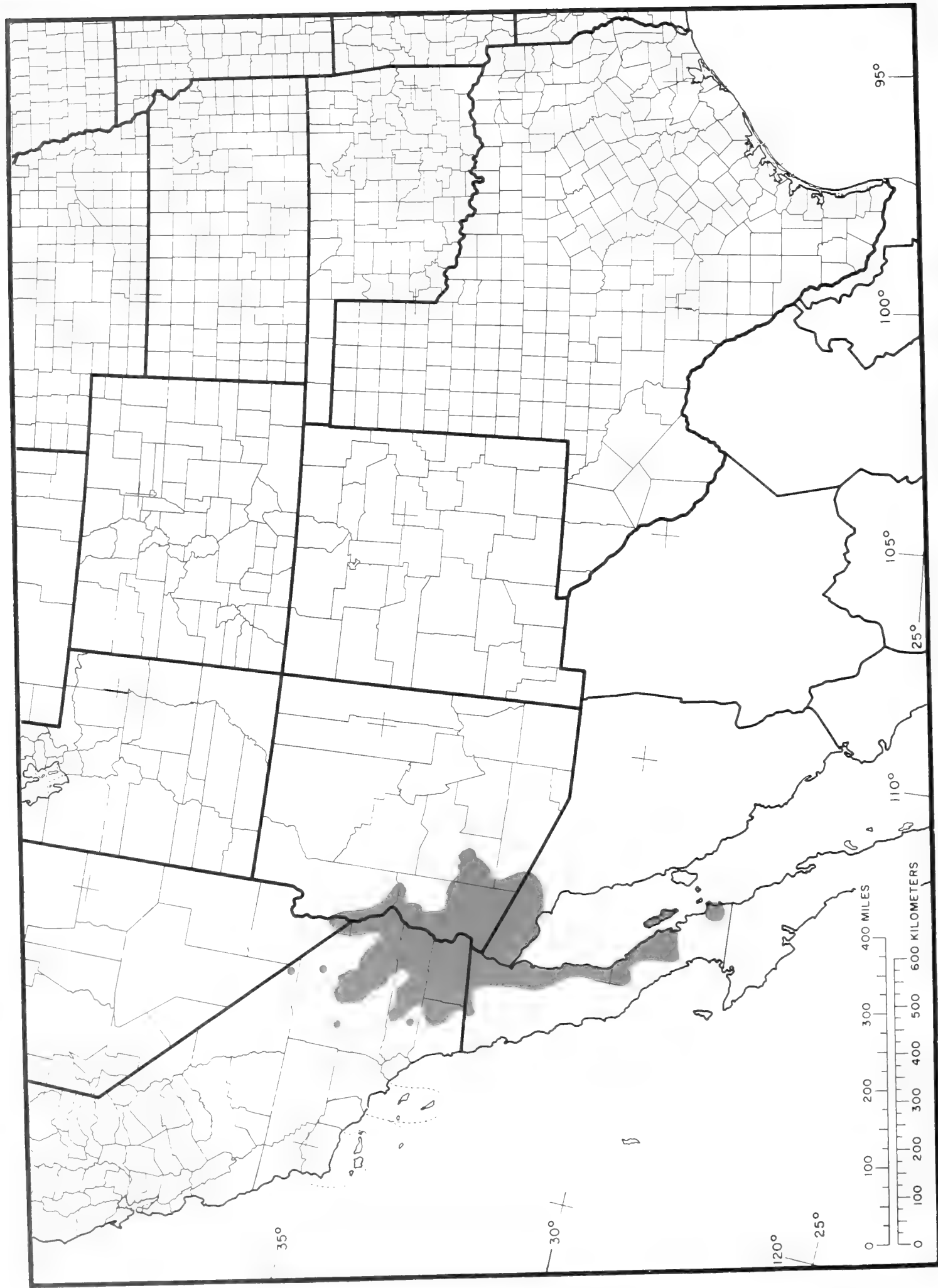
Map 61. *Crataegus saligna* Greene, willow hawthorn. Western Colorado only.



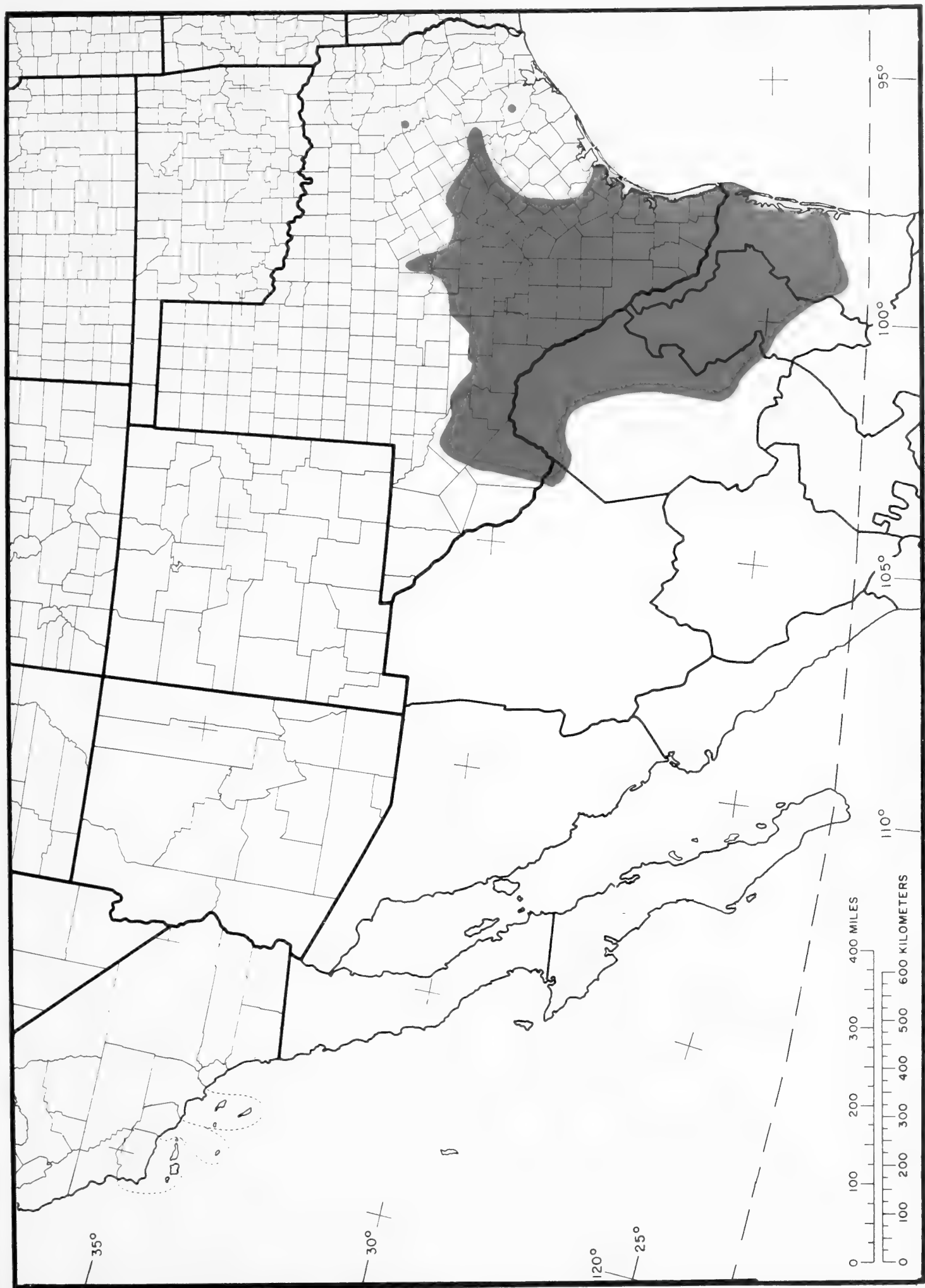
Map 62. *Crataegus succulenta* Schrad., fleshy hawthorn, western range. Also east to Nova Scotia, Maine, and North Carolina (not mapped).



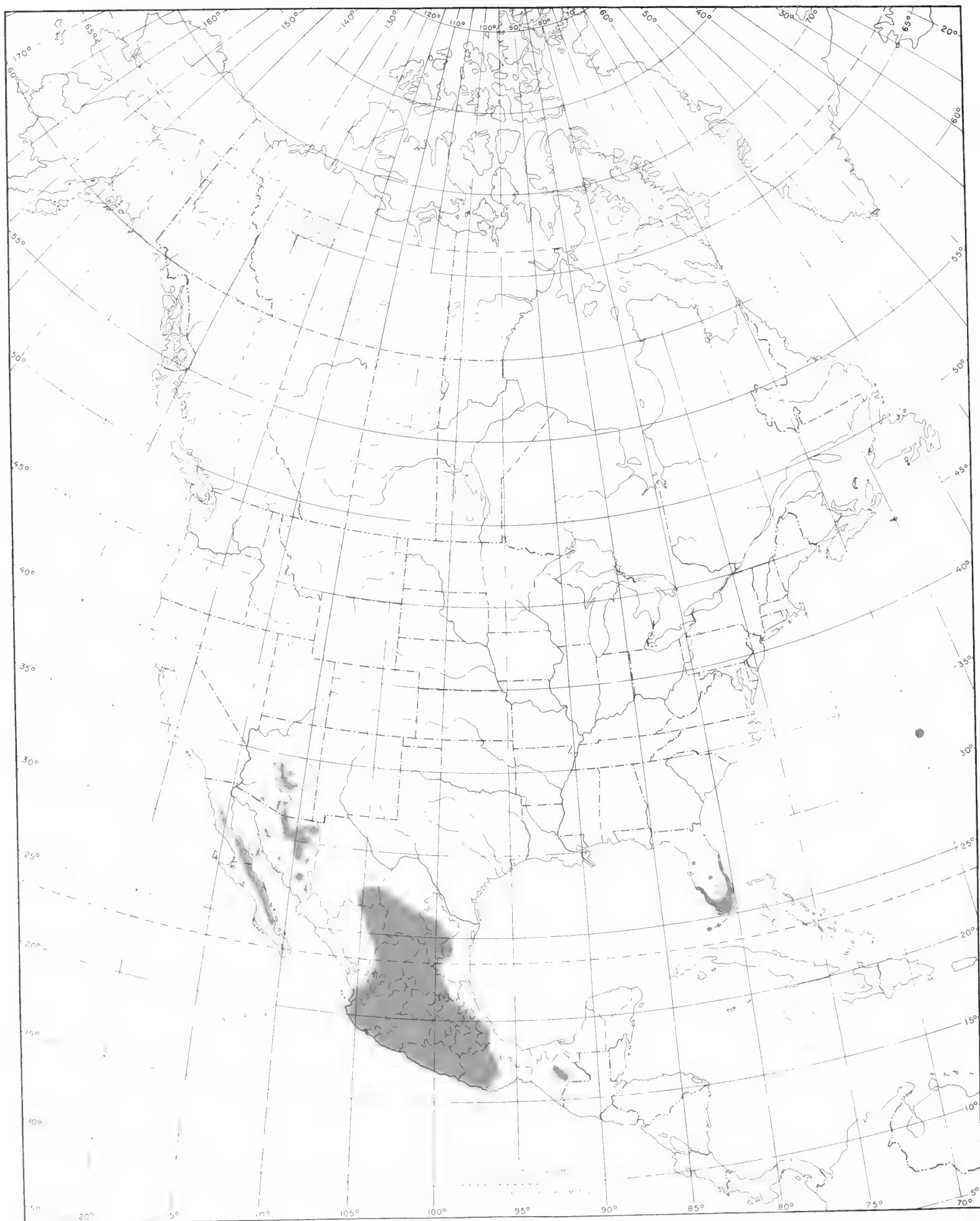
Map 63. *Crataegus tracyi* Ashe, Tracy hawthorn. Texas and Coahuila only.



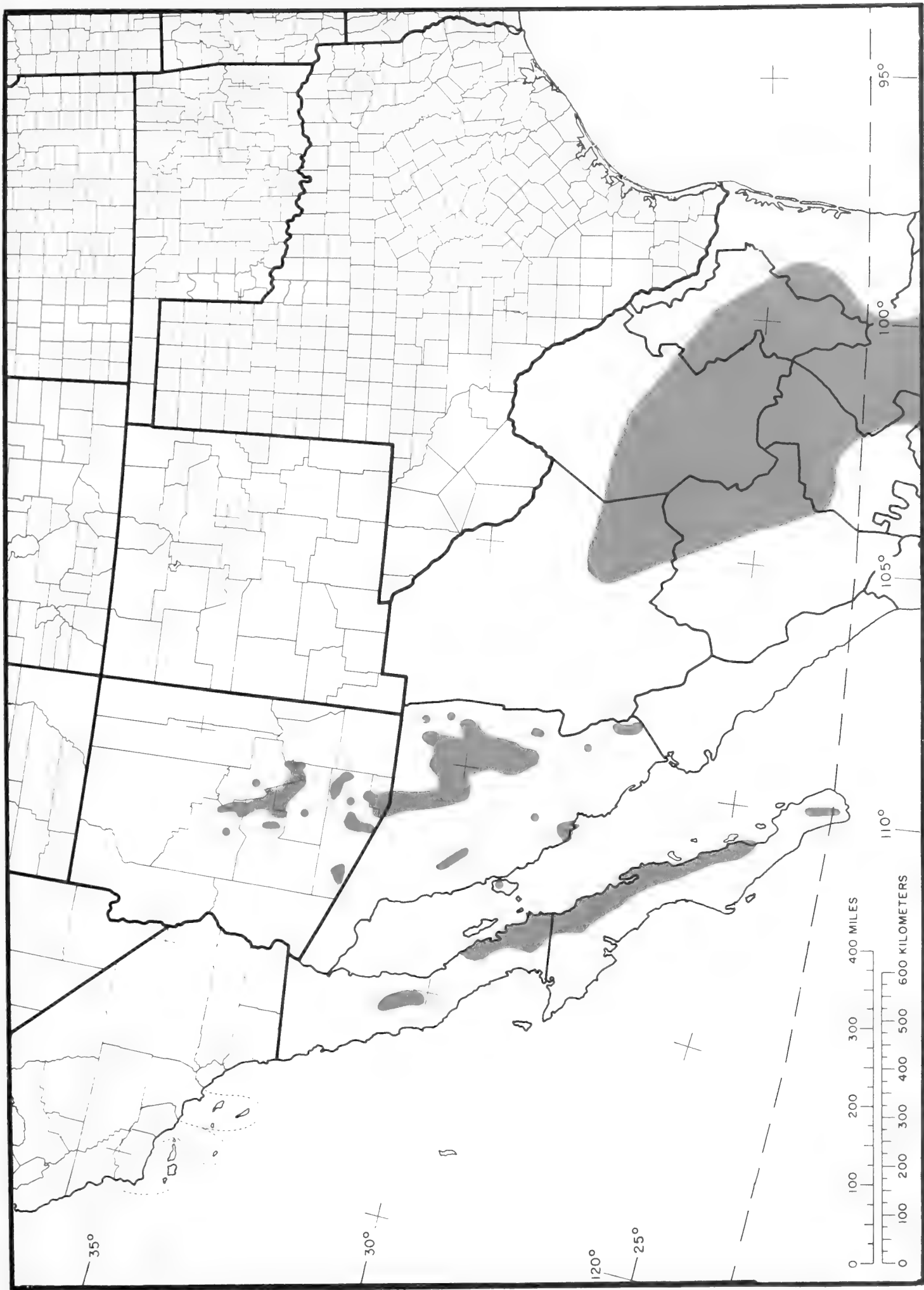
Map 64. *Dalea spinosa* A. Gray, smokethorn. Western Arizona, southeastern California, Baja California, and Sonora.



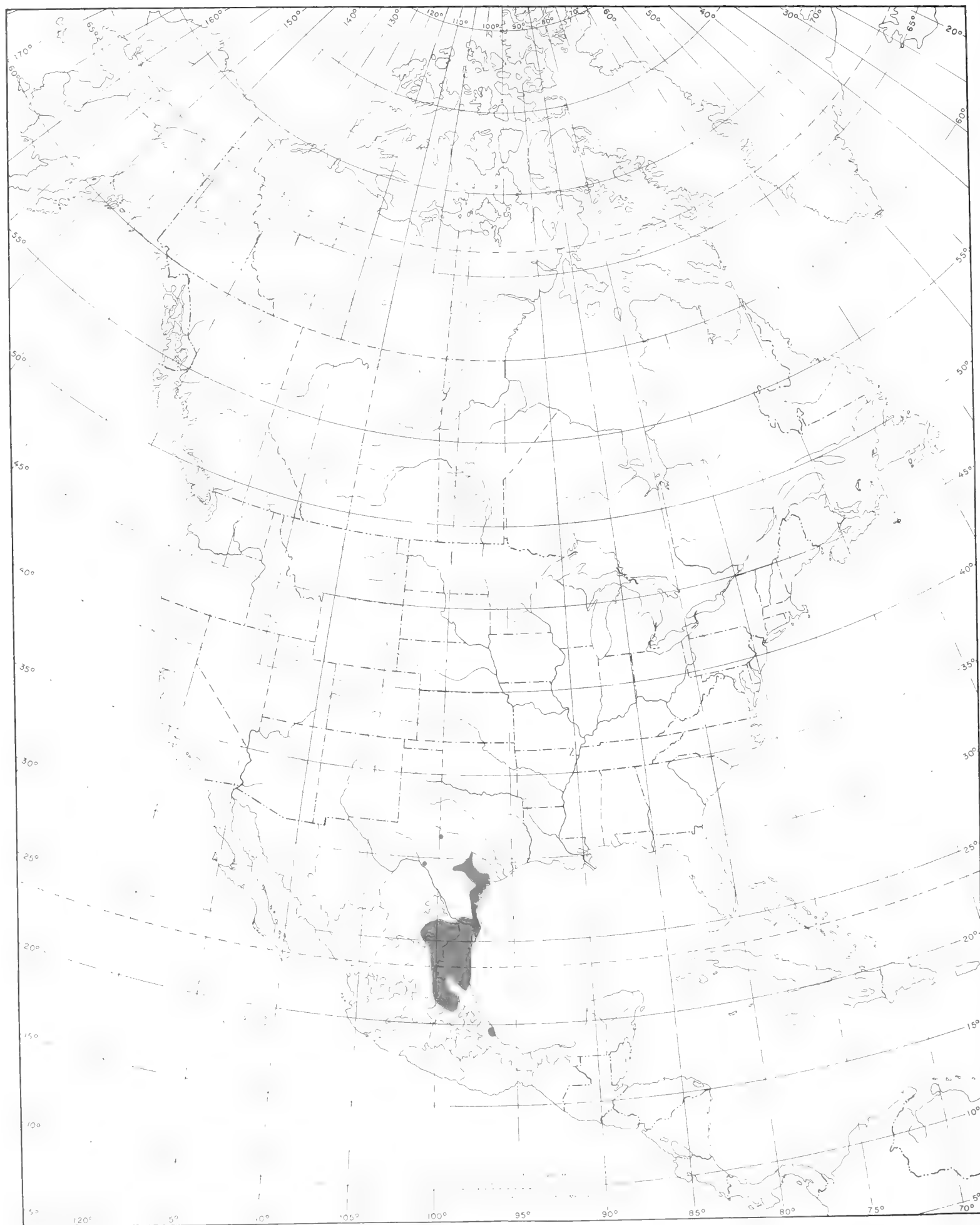
Map 65. *Diospyros texana* Scheele, Texas persimmon.



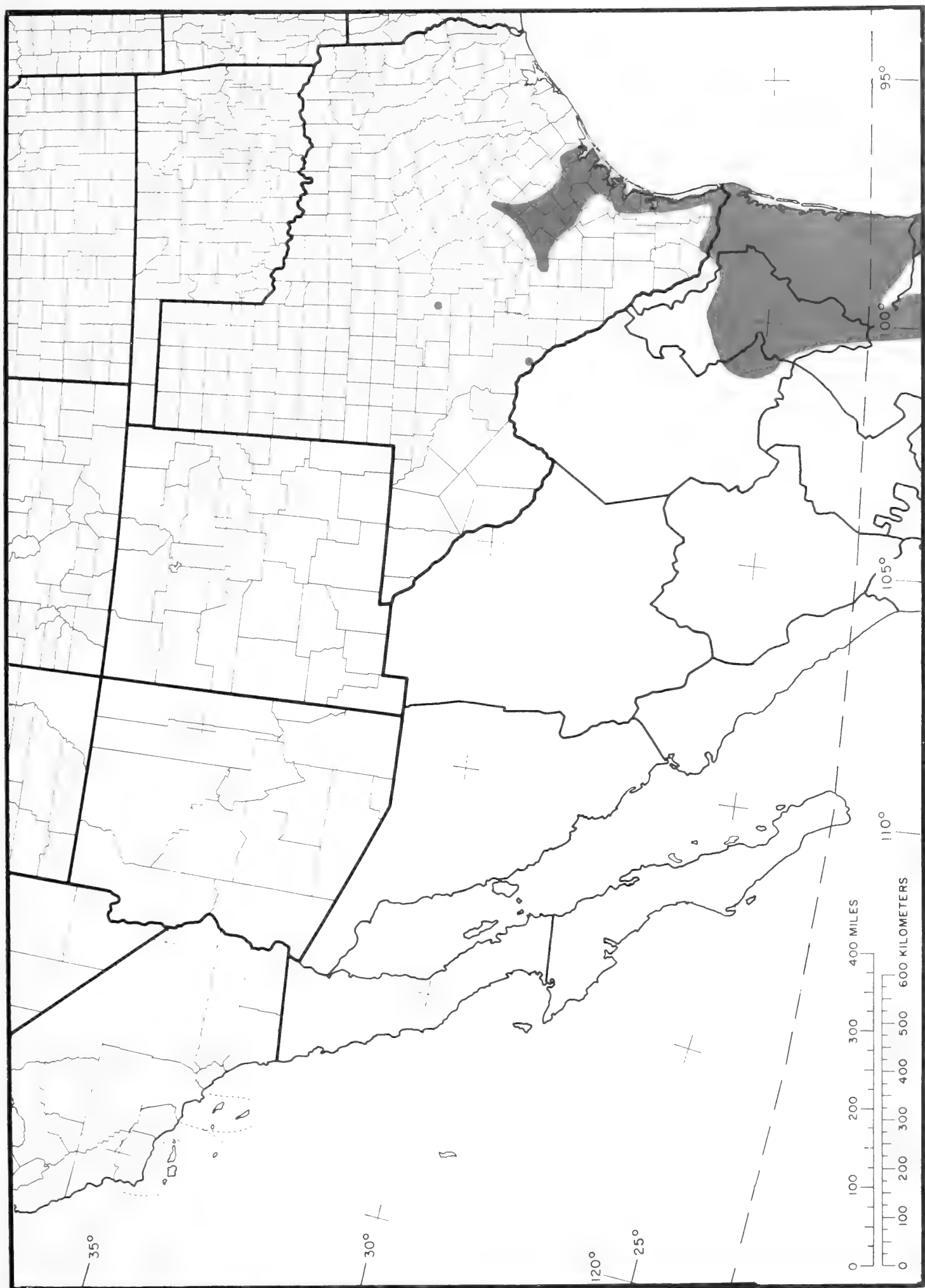
Map 66-N. *Dodonaea viscosa* (L.) Jacq., hopbush. Also widespread through tropical America (not mapped) from West Indies and Central America southward and in Old World tropics.



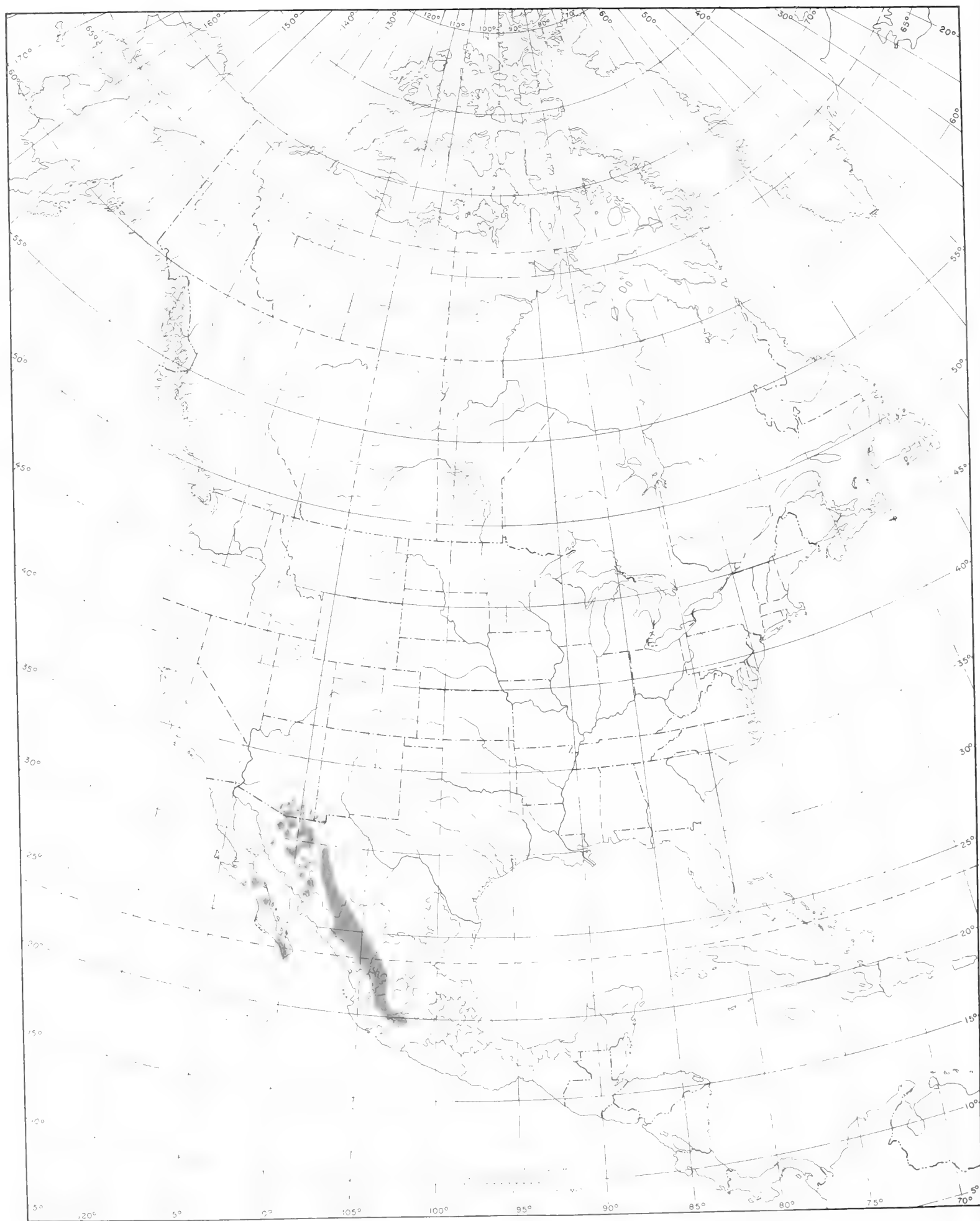
Map 66-SW. *Dodonaea viscosa* (L.) Jacq., hopbush, western range. A shrub in Arizona but tree in southern Florida and southward.



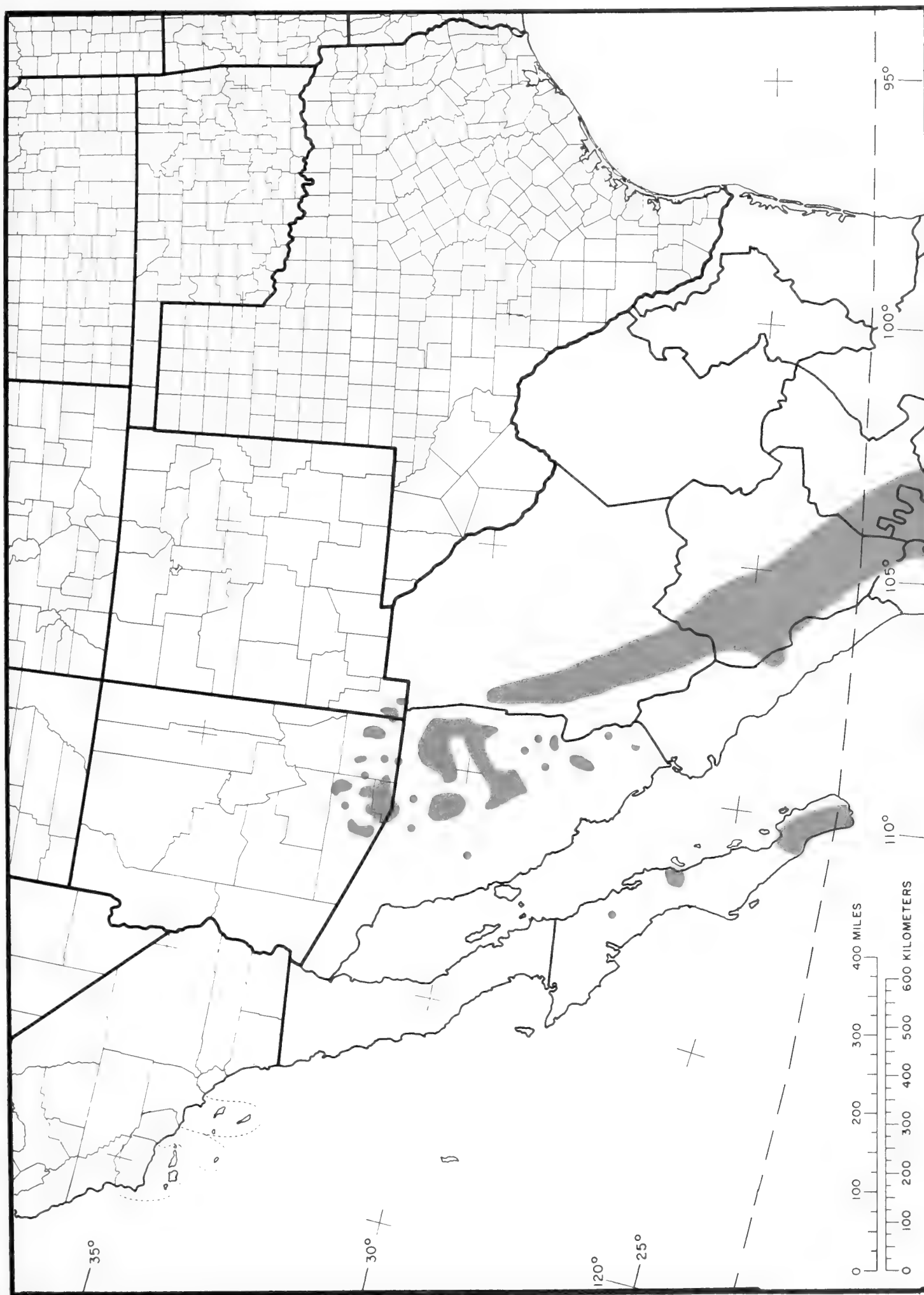
Map 67-N. *Ehretia anacua* (Mier & Berland.) Johnst., anacua.



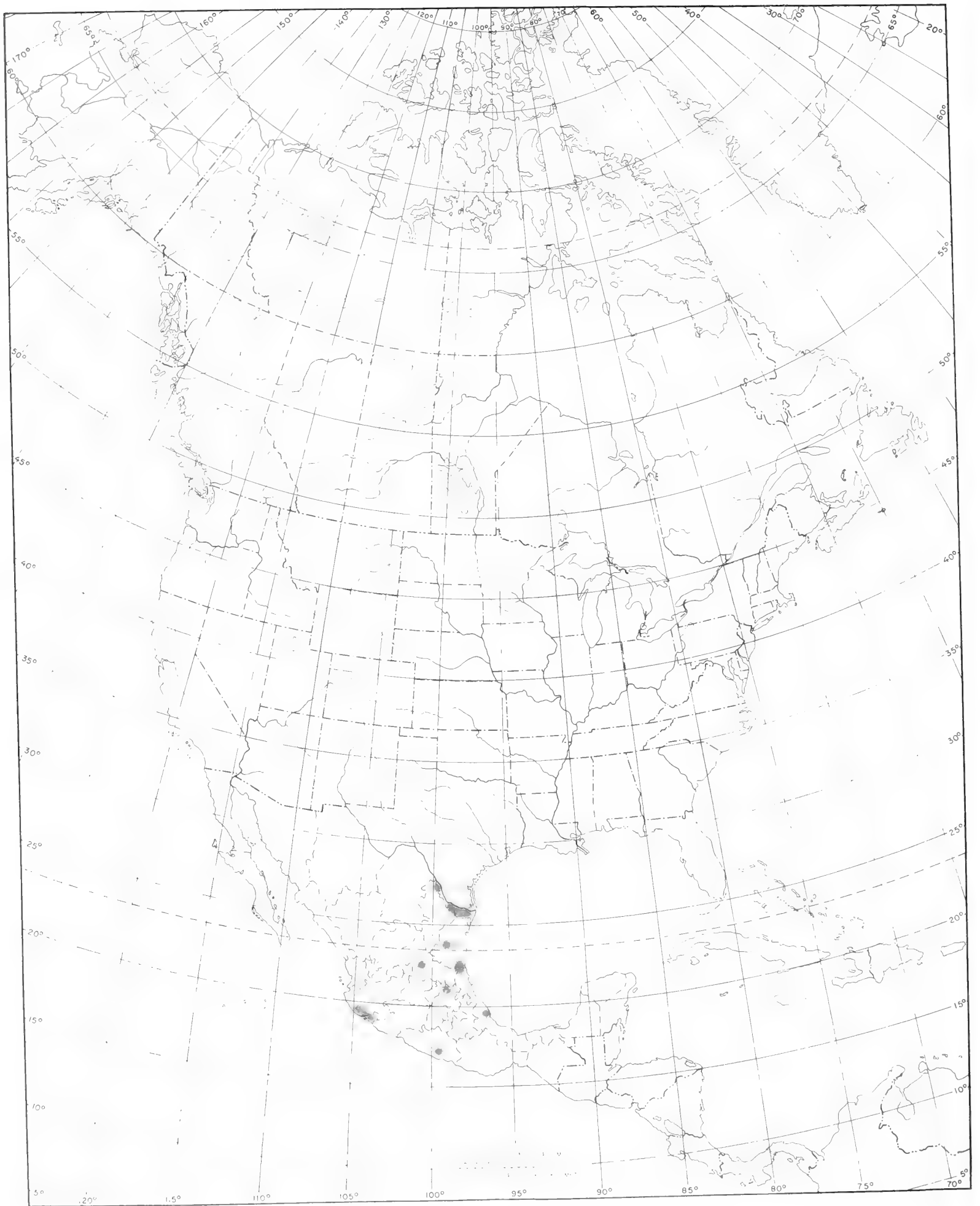
Map 67-SW. *Ehretia anacua* (Mier & Berland.) Johnston, anaqua. Southern Texas and Mexico.



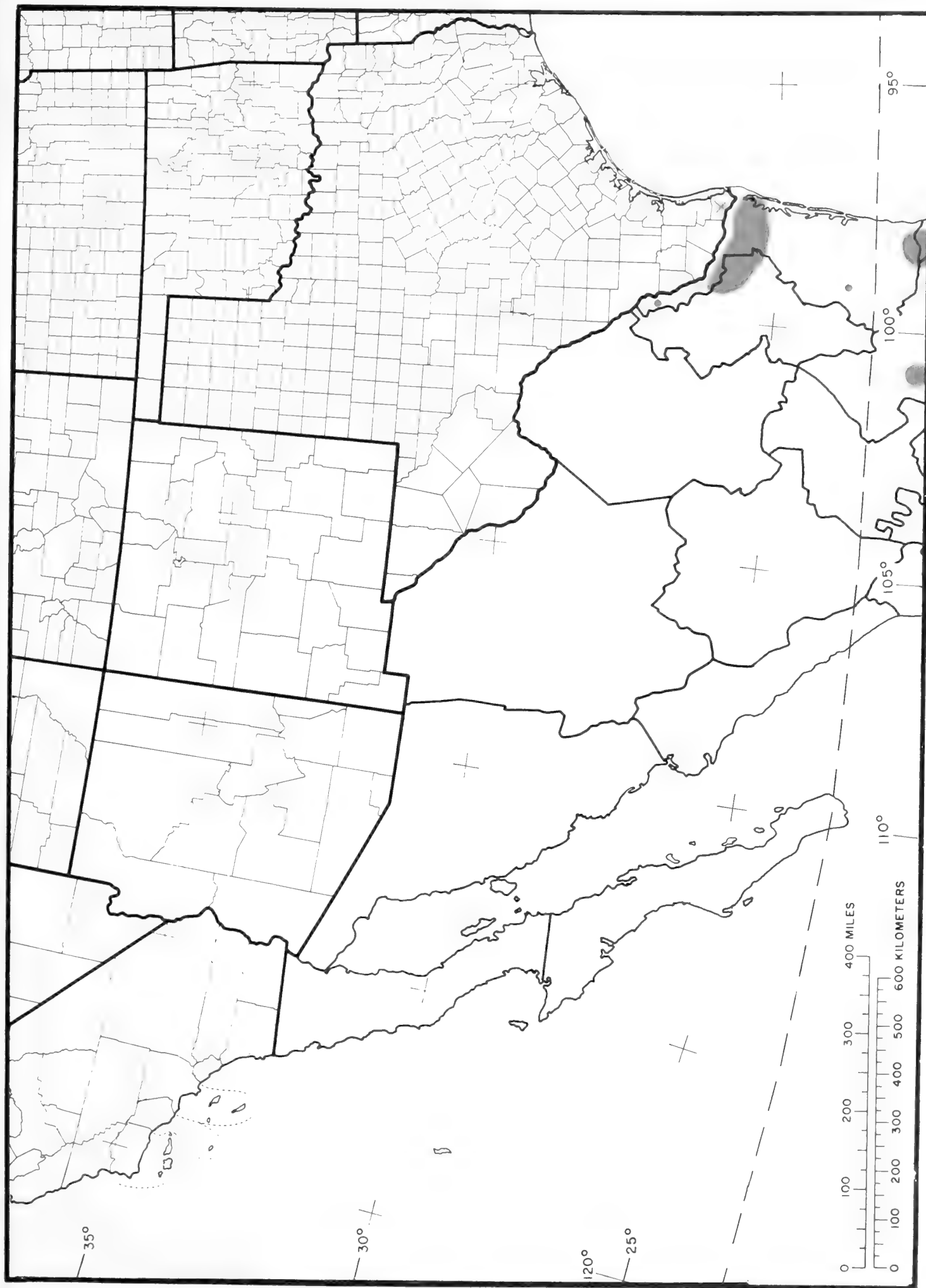
Map 68-N. *Erythrina flabelliformis* Kearney, southwestern coralbean.



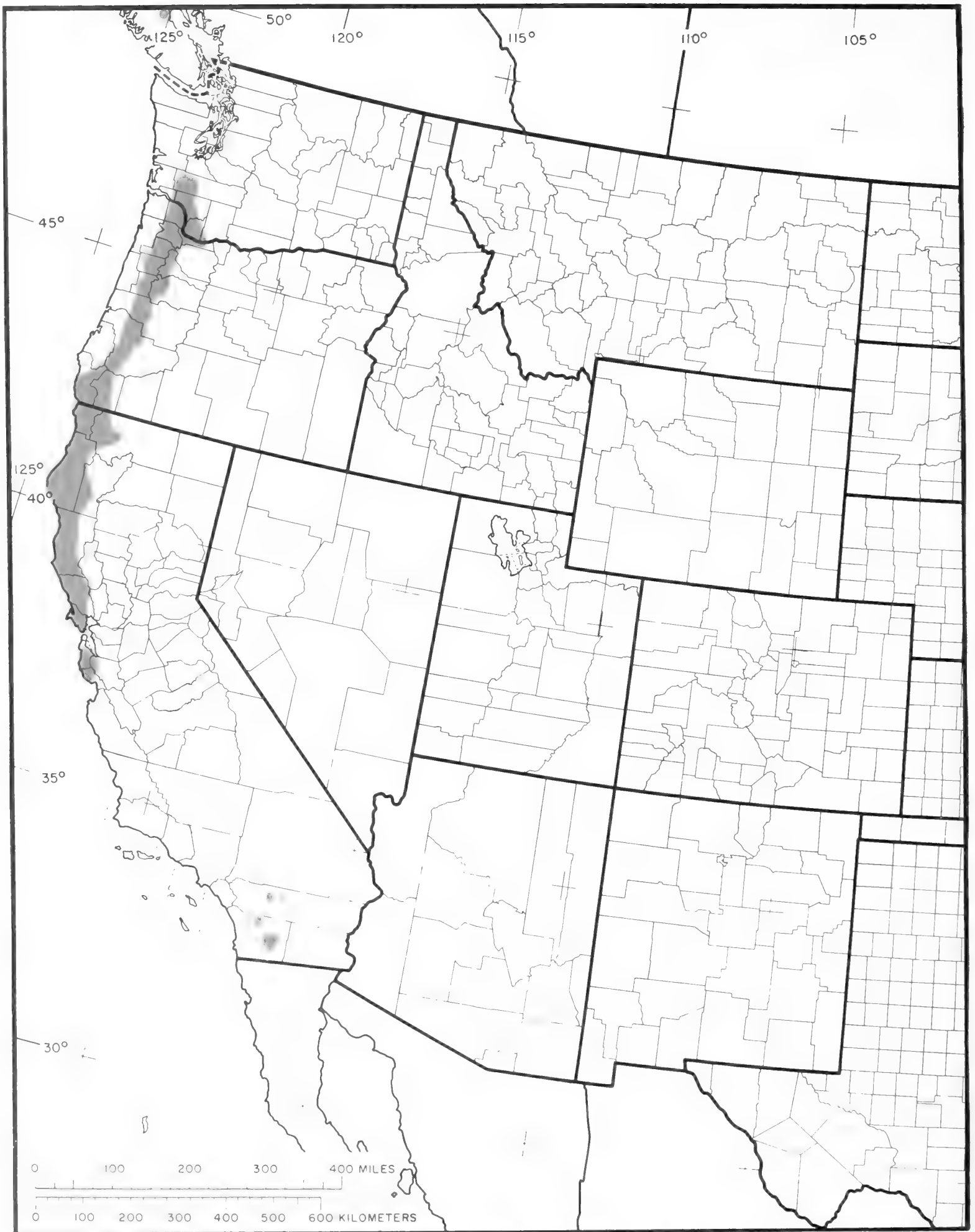
Map 68-SW. *Erythrina flabelliformis* Kearney, southwestern Arizona, extreme southeastern New Mexico, and Mexico.



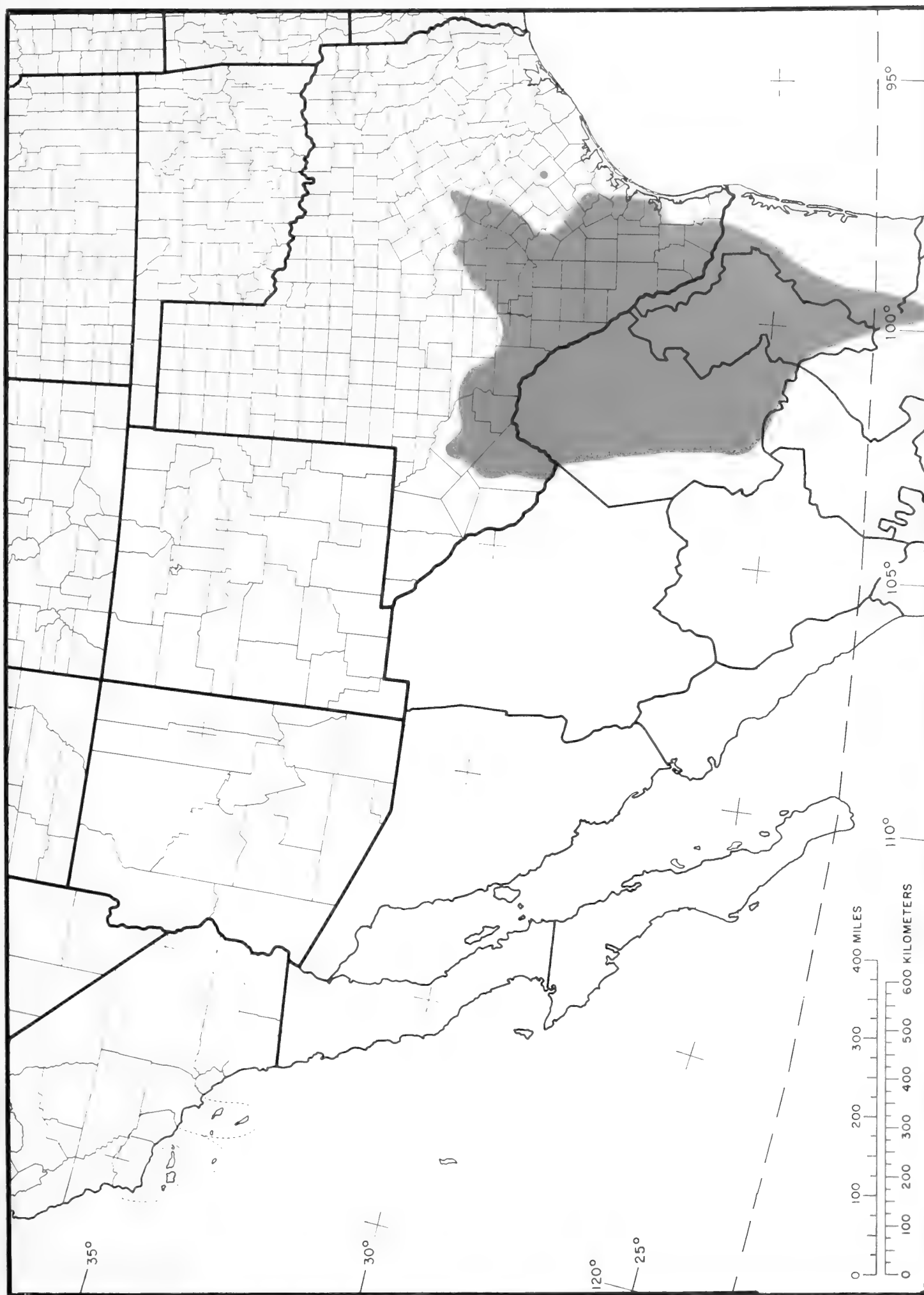
Map 69-N. *Esenbeckia berlandieri* Baill., *Berlandier esenbeckia*.



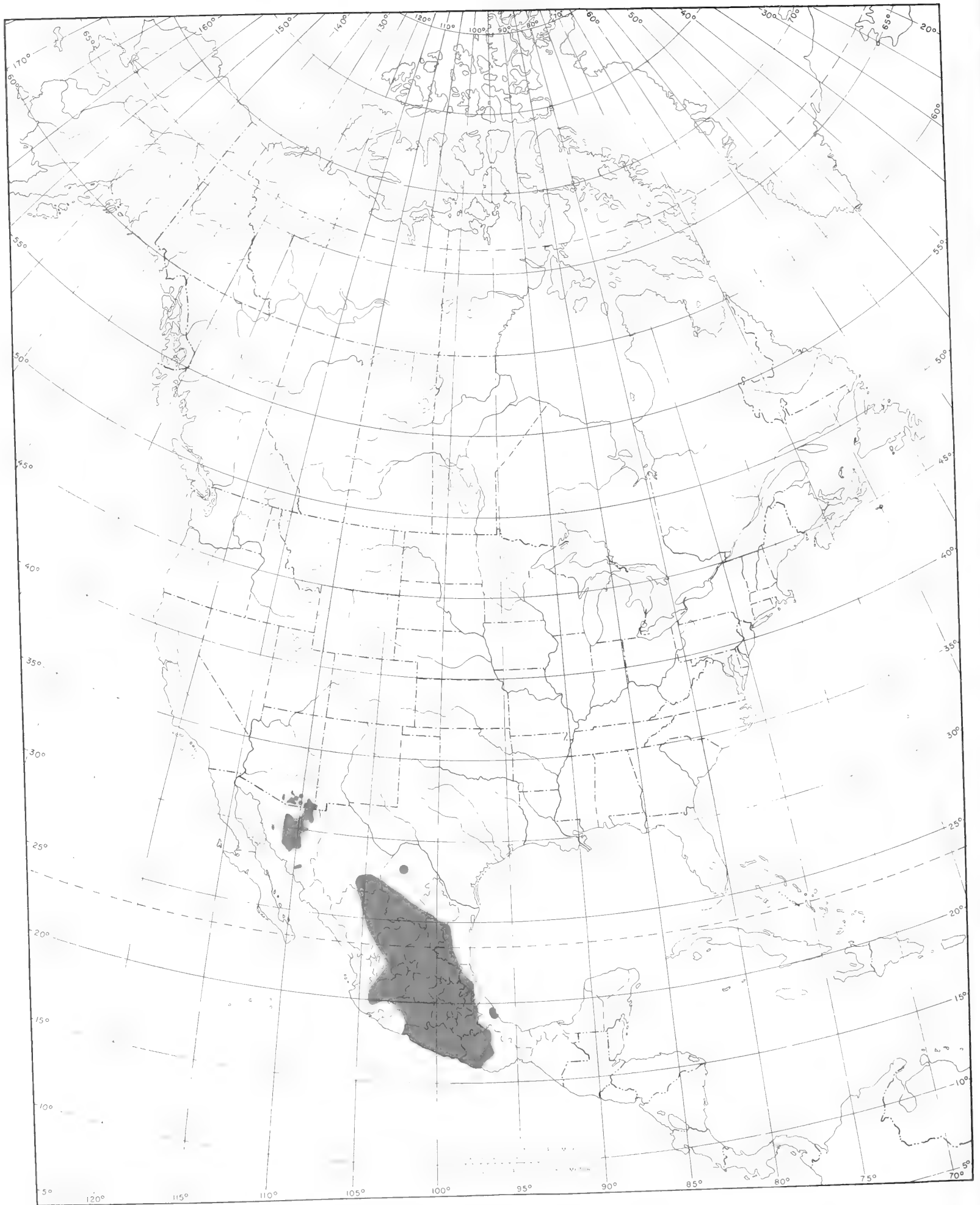
Map 69-SW. *Esenbeckia berlandieri* Baill., *Berlandier esenbeckii* a. Extinct (X) in extreme southern Texas, except in cultivation. Also in Mexico.



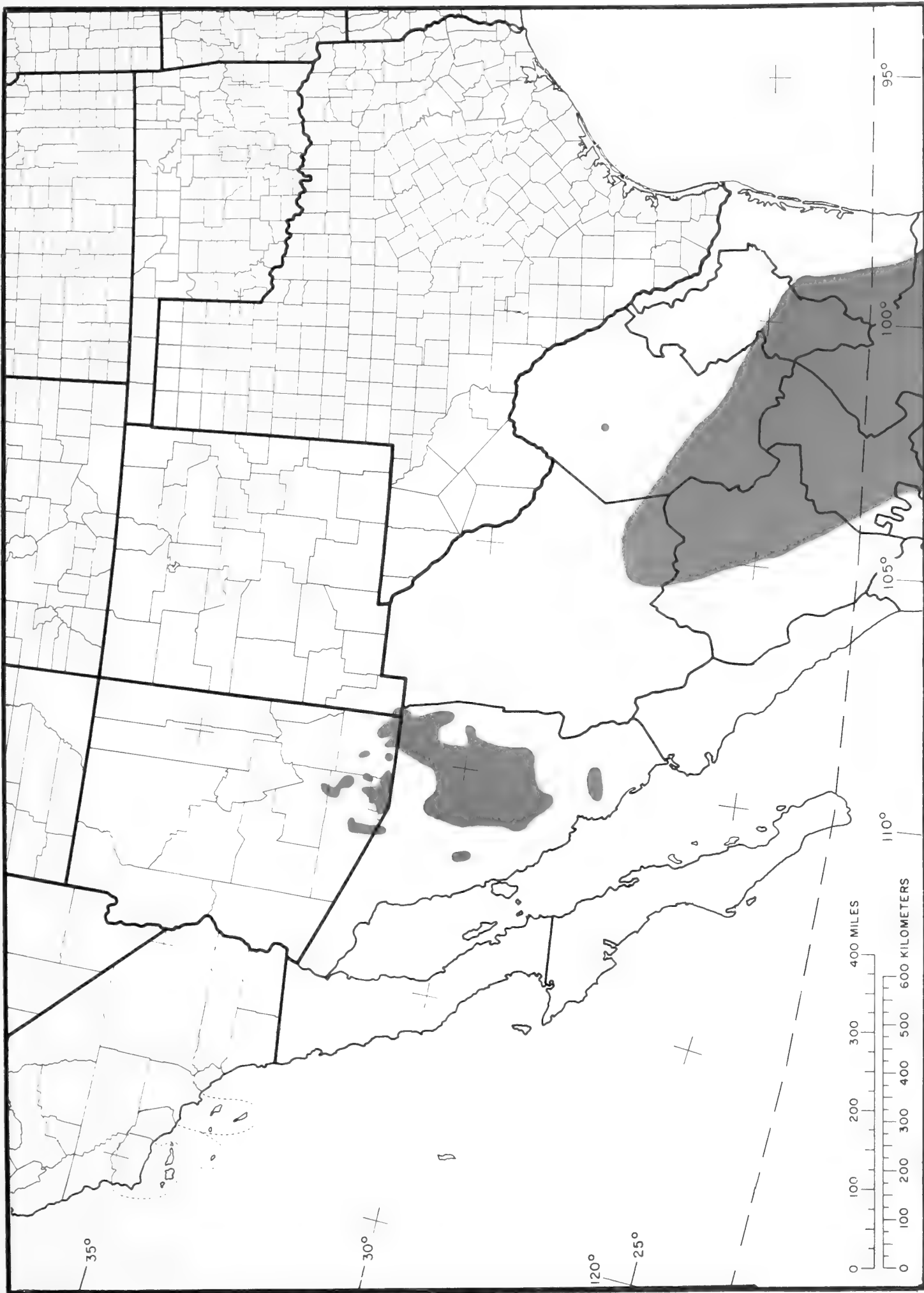
Map 70. *Euonymus occidentalis* Nutt.. western wahoo.



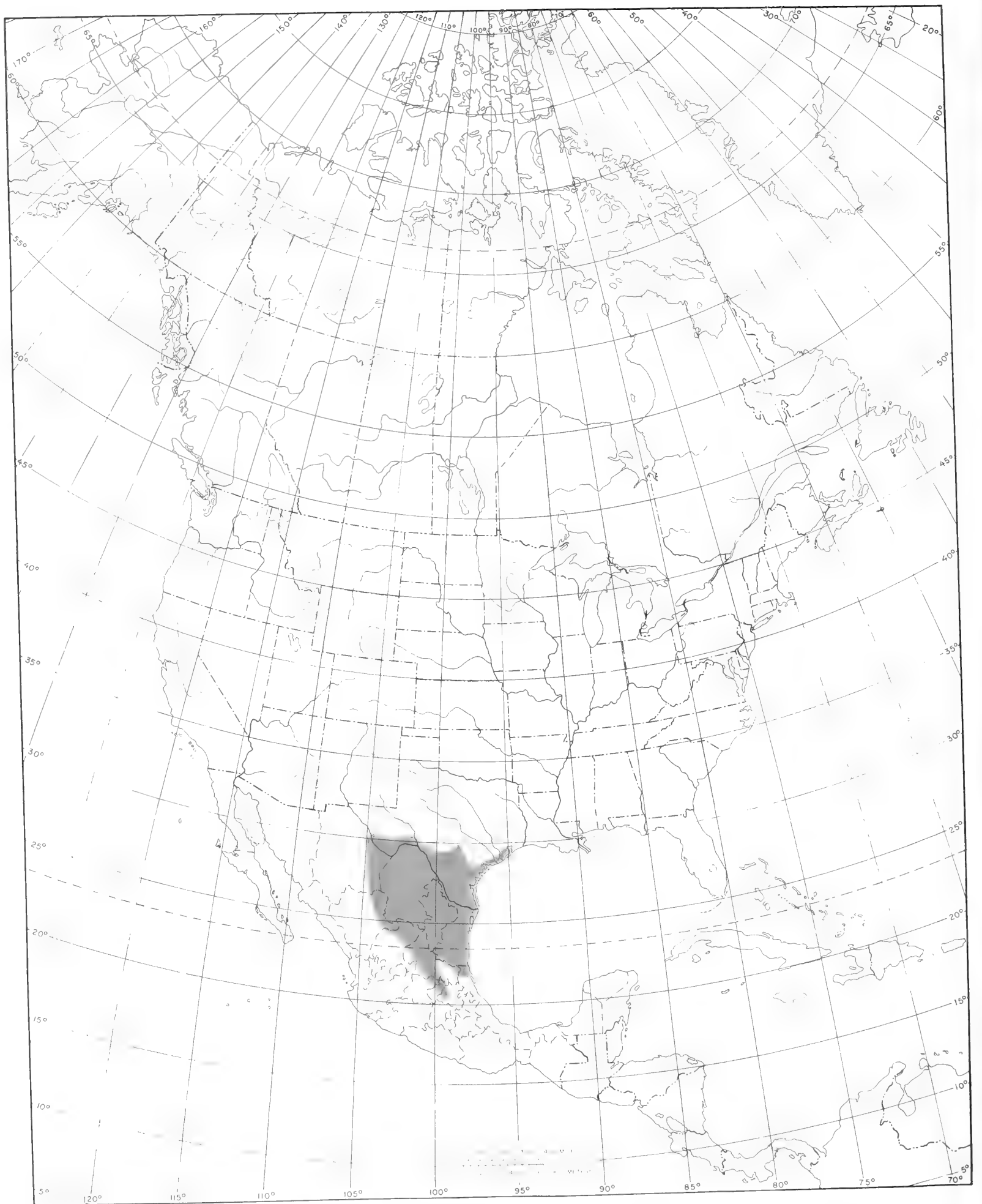
Map 71. *Eysenhardtia texana* Scheele, Texas kidneywood. Texas and northeastern Mexico.



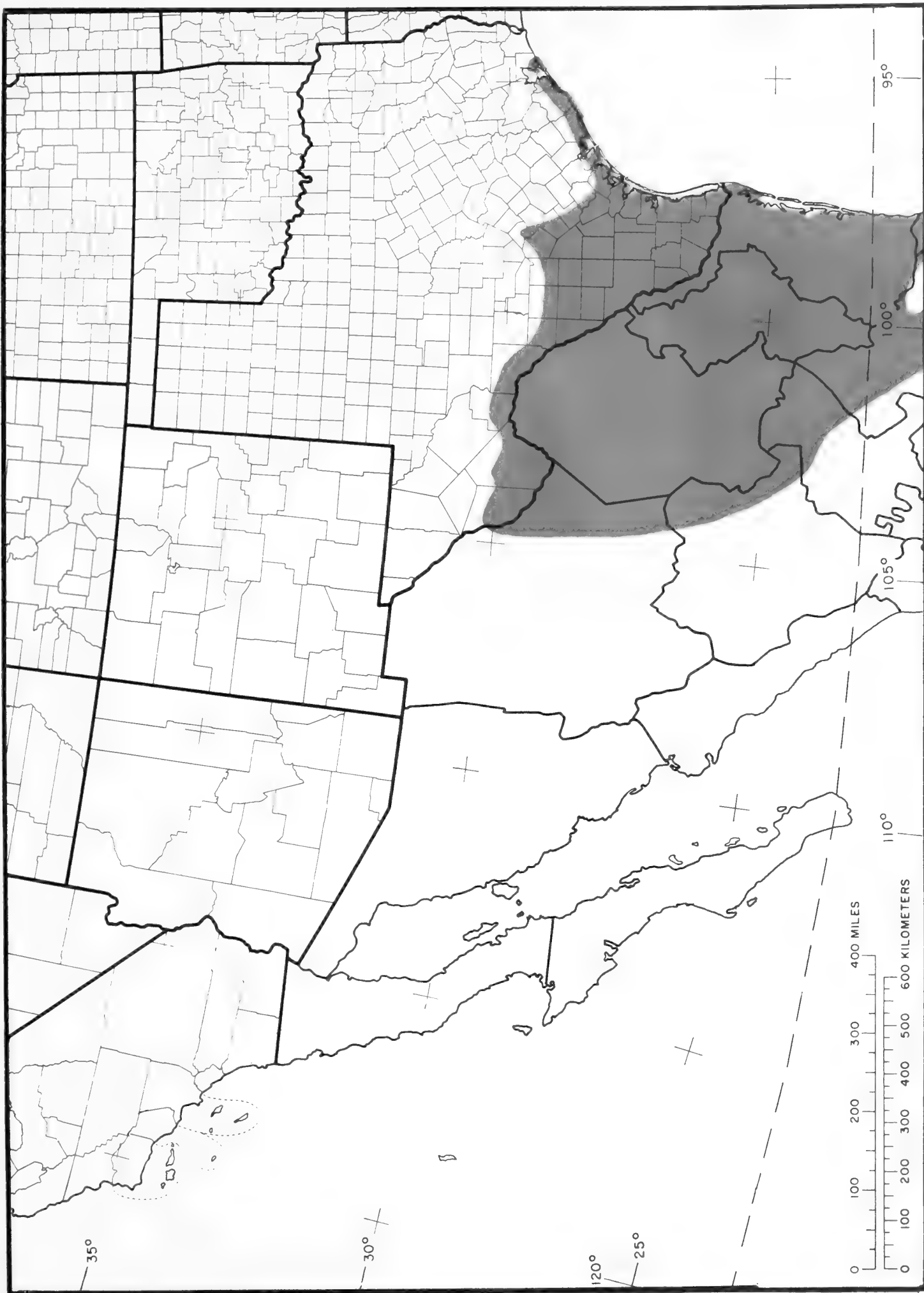
Map 72-N. *Eysenhardtia polystachya* (Ortega) Sarg., kidneywood.



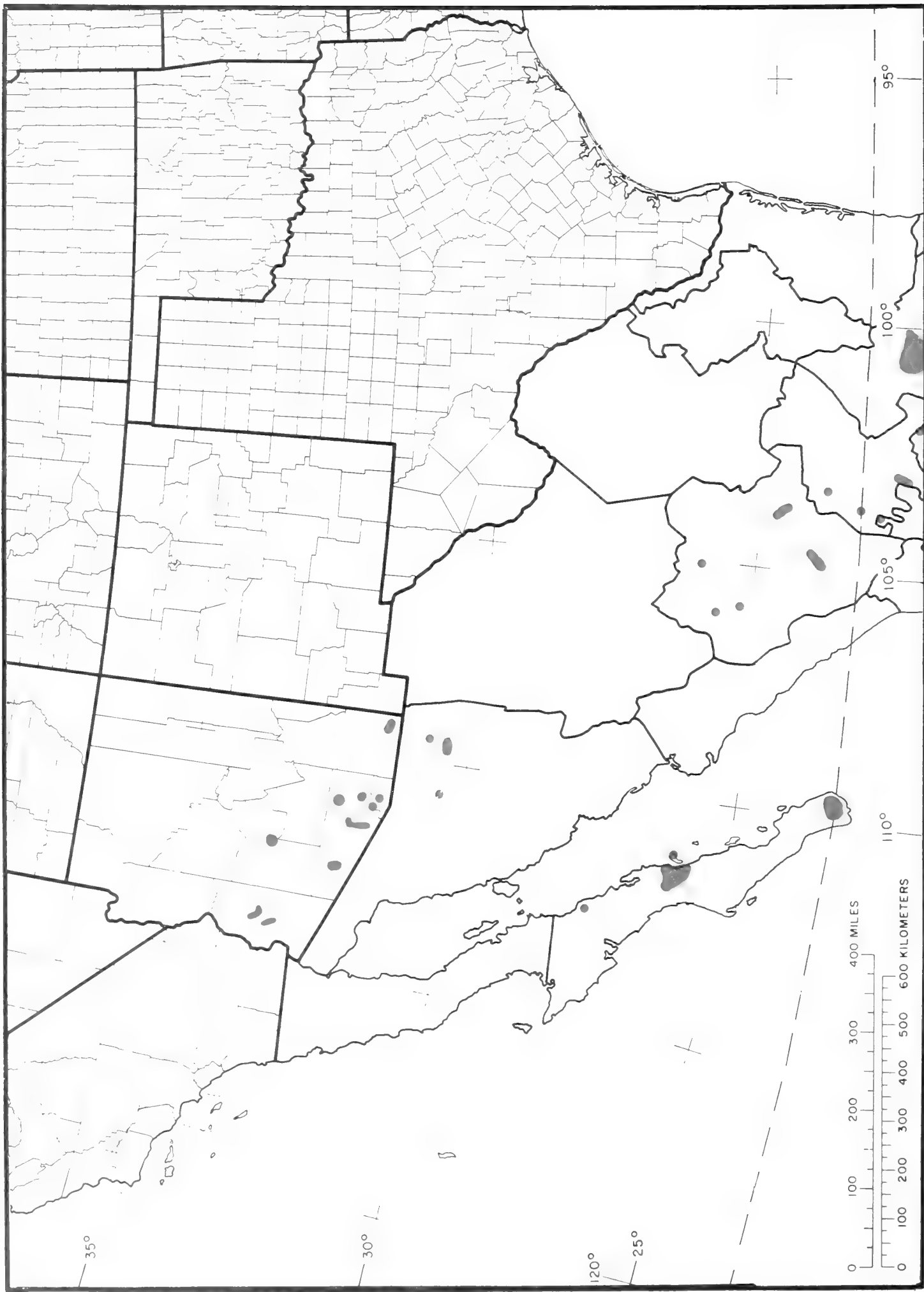
Map 72-W. *Eysenhardtia polystachya* (Ortega) Sarg., kidneywood.



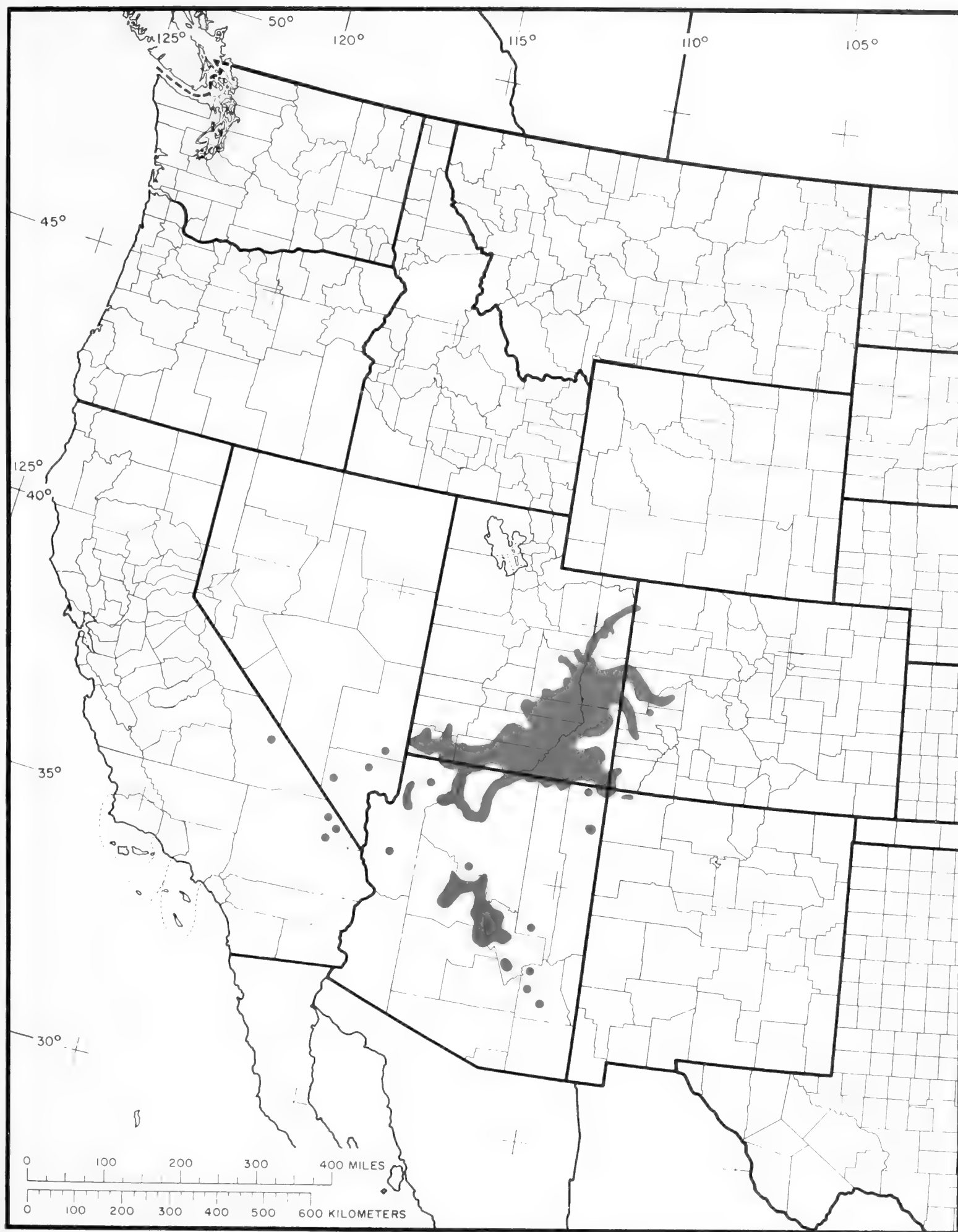
Map 73-N. *Forestiera angustifolia* Torr., Texas forestiera.



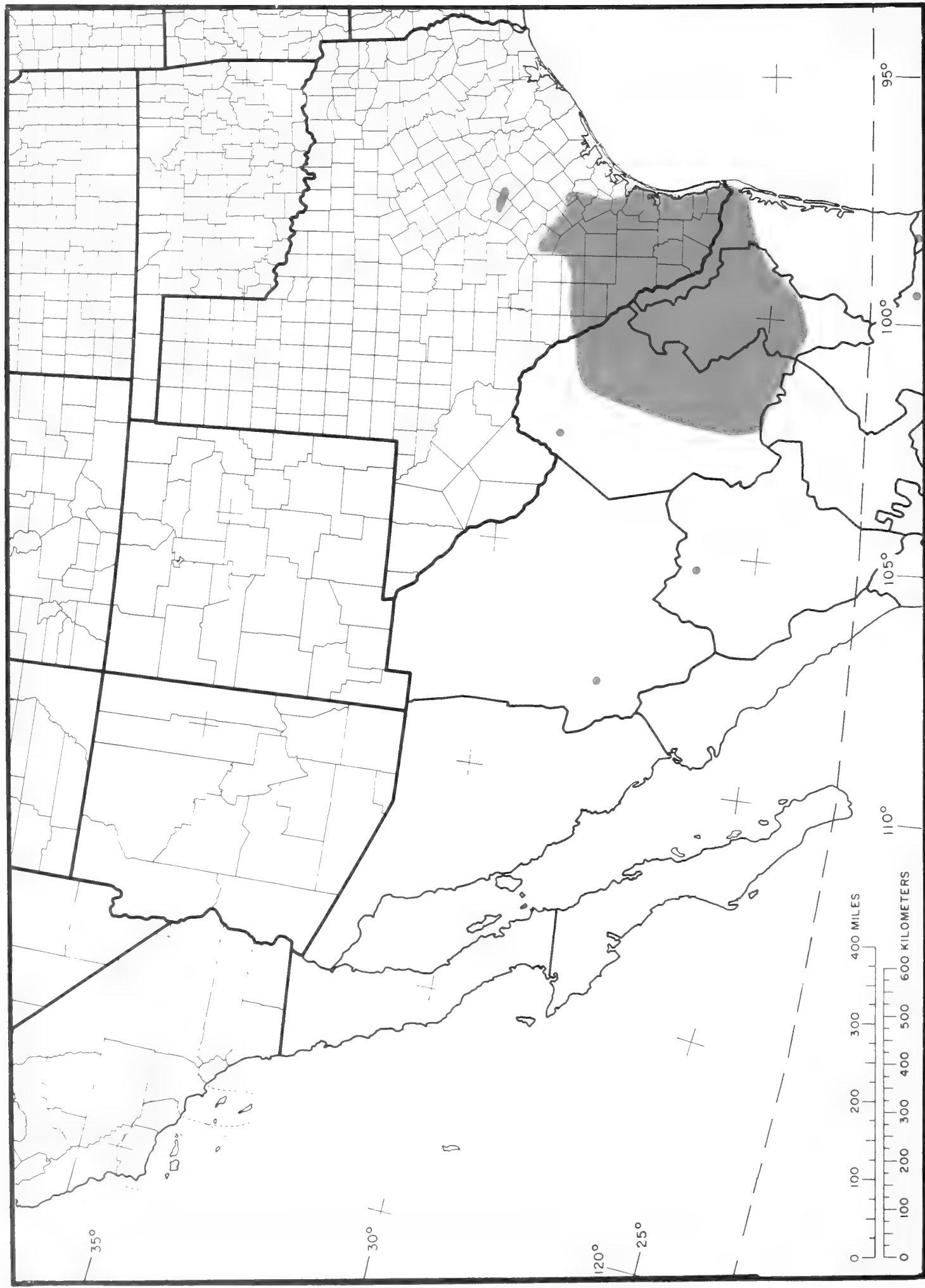
Map 73-W. *Forestiera angustifolia* Torr., Texas forestiera.



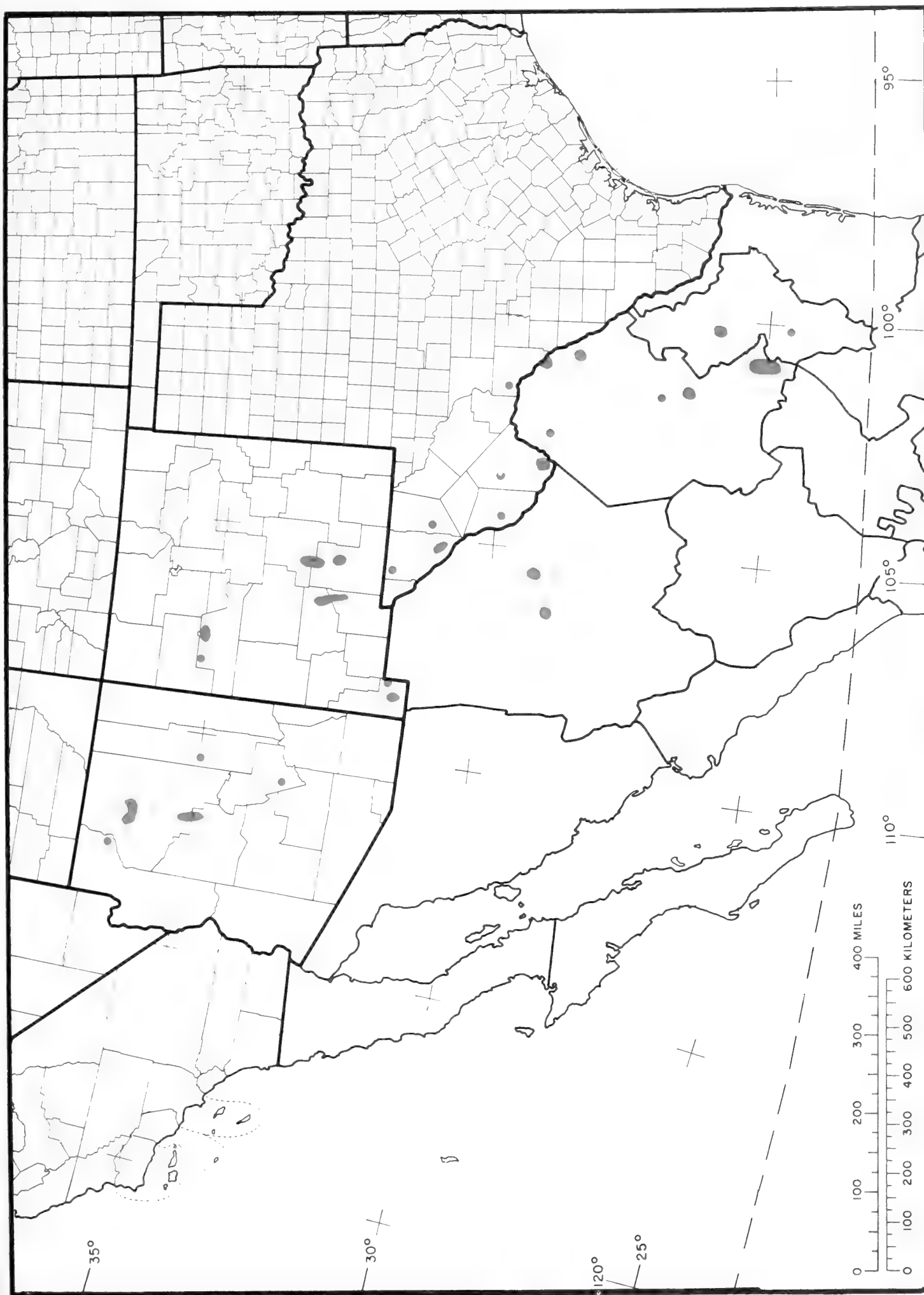
Map 74. *Forestiera phillyreoides* (Benth.) Torr., desert-olive forestiera. Southern Arizona and Mexico south to Guerrero and Oaxaca (not mapped).



Map 75. *Fraxinus anomala* Torr., singleleaf ash.



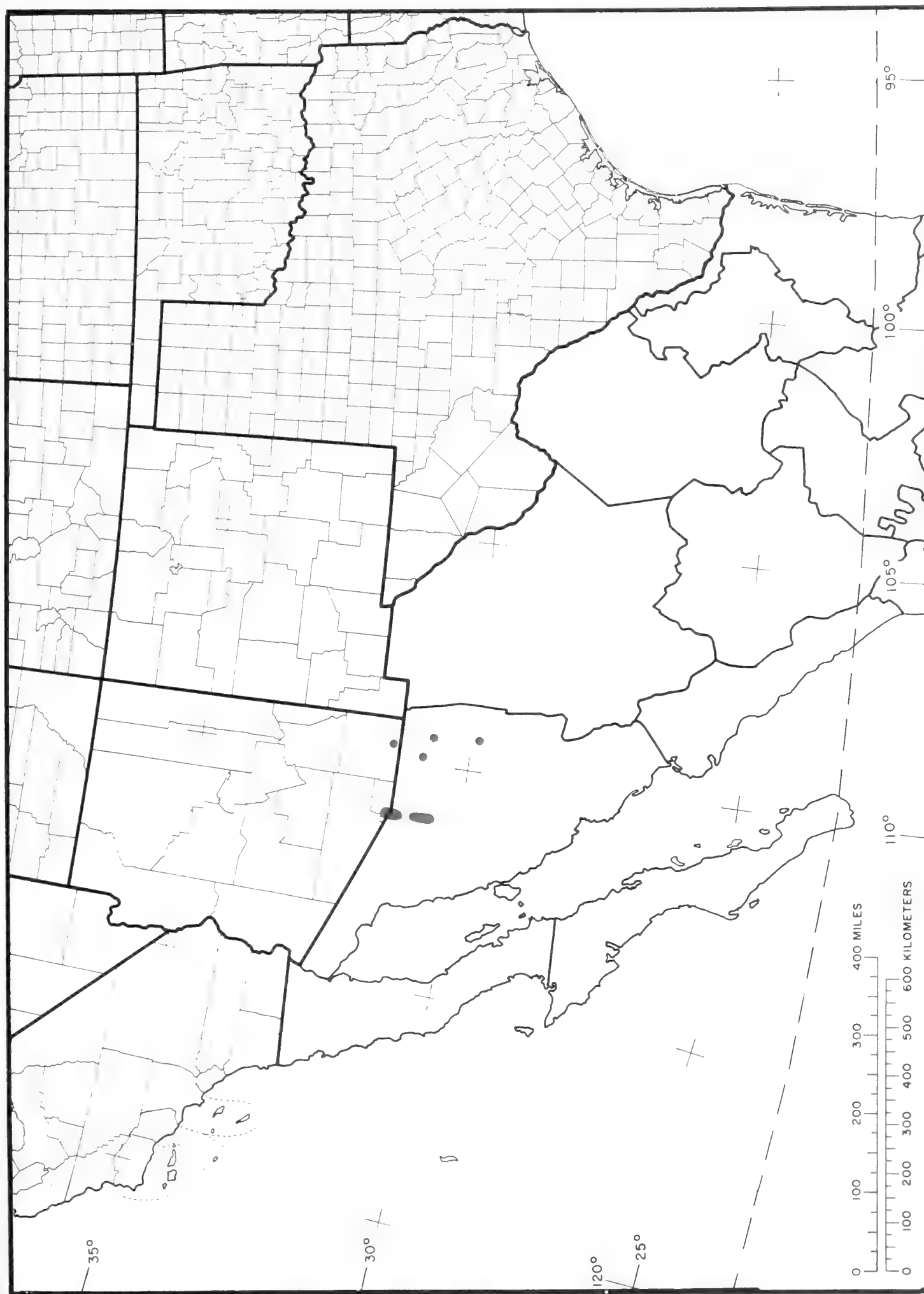
Map 76. *Fraxinus berlandieriana* A. DC., Berlandier ash. Texas and northeastern Mexico.



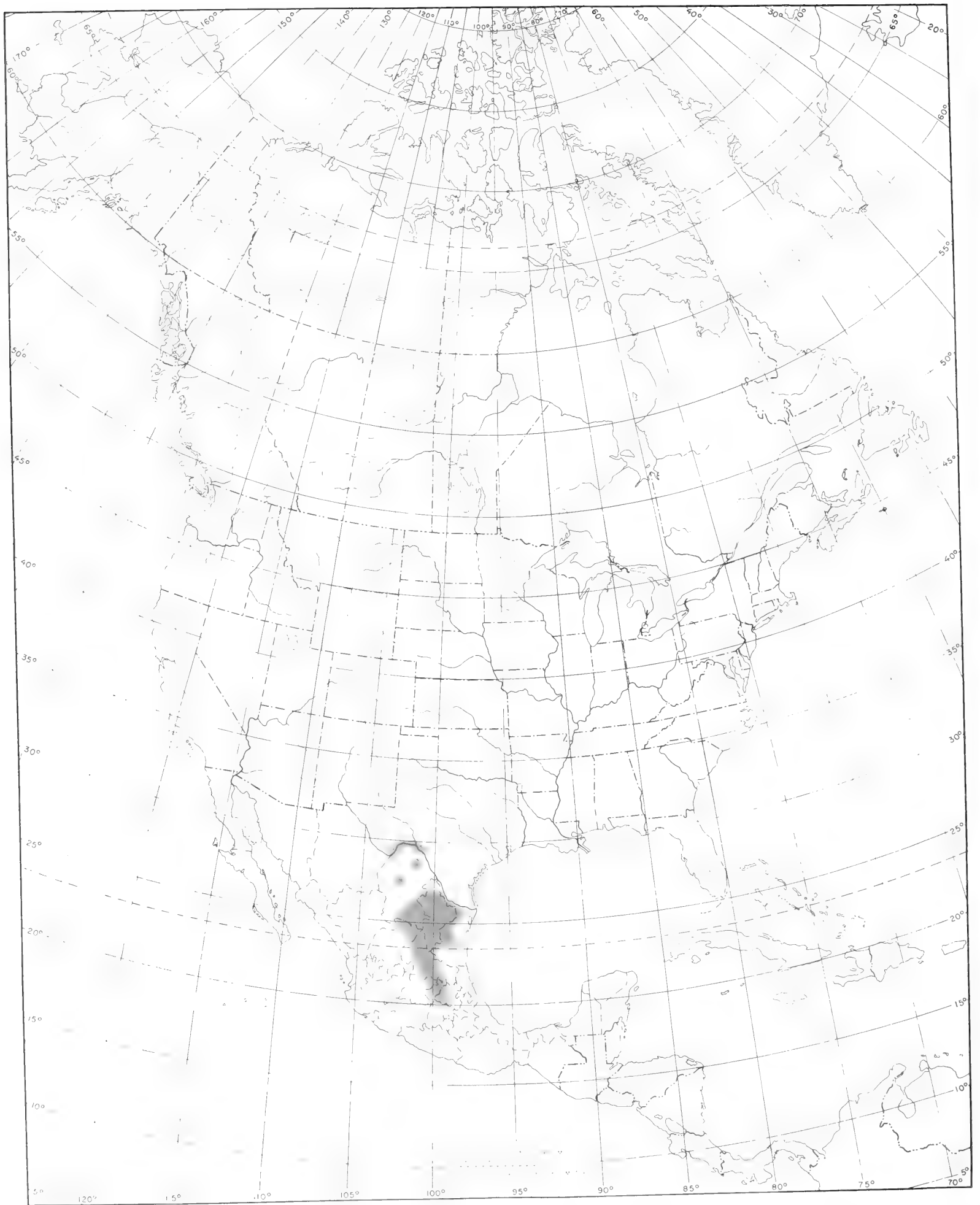
Map 77. *Fraxinus cuspidata* Torr., fragrant ash.



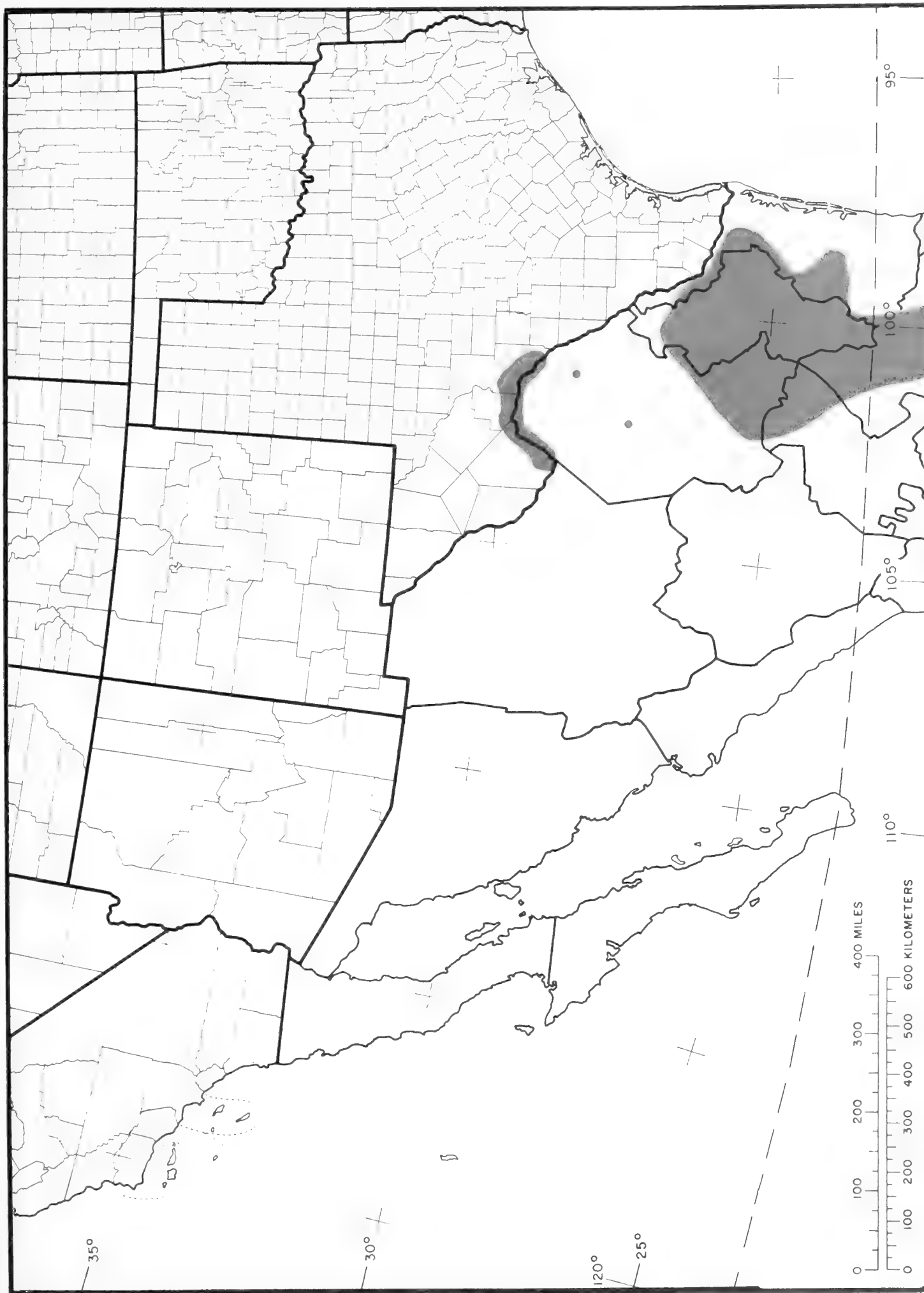
Map 78. *Fraxinus dipetala* Hook. & Arn., two-petal ash.



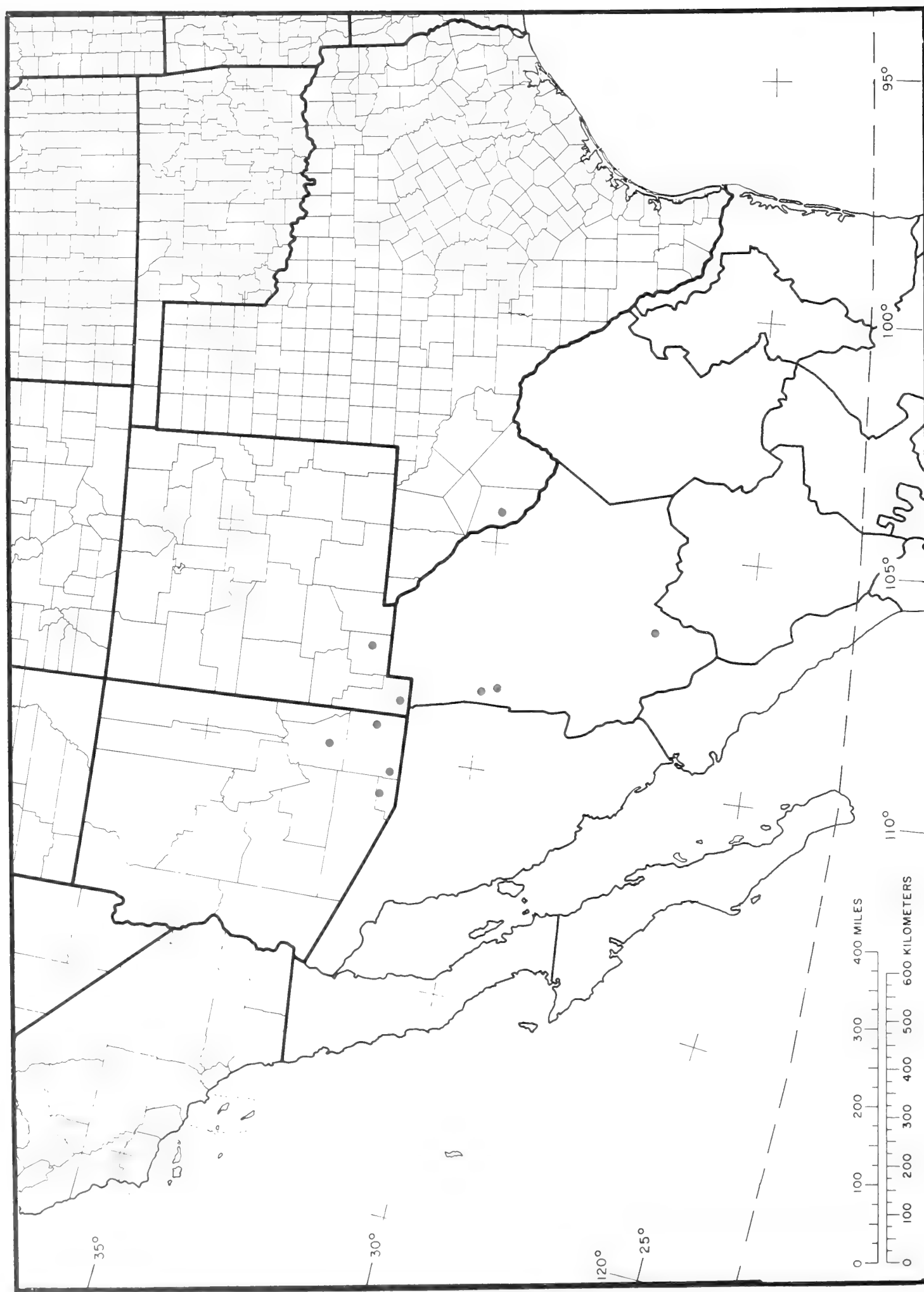
Map 79. *Fraxinus gooddingii* Little. Goodding ash. Southeastern Arizona and northeastern Sonora only.



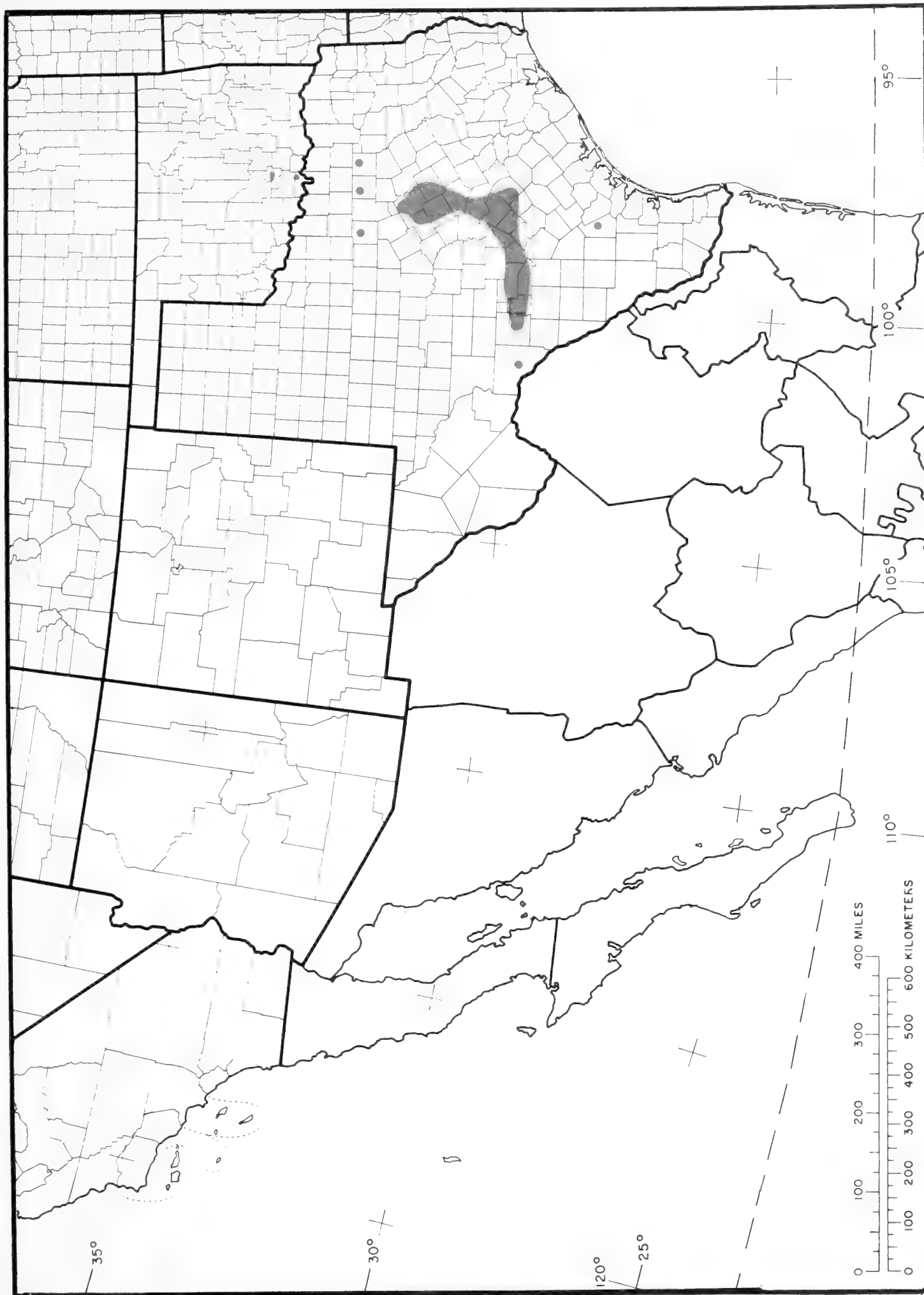
Map 80-N. *Fraxinus greggii* A. Gray, Gregg ash.



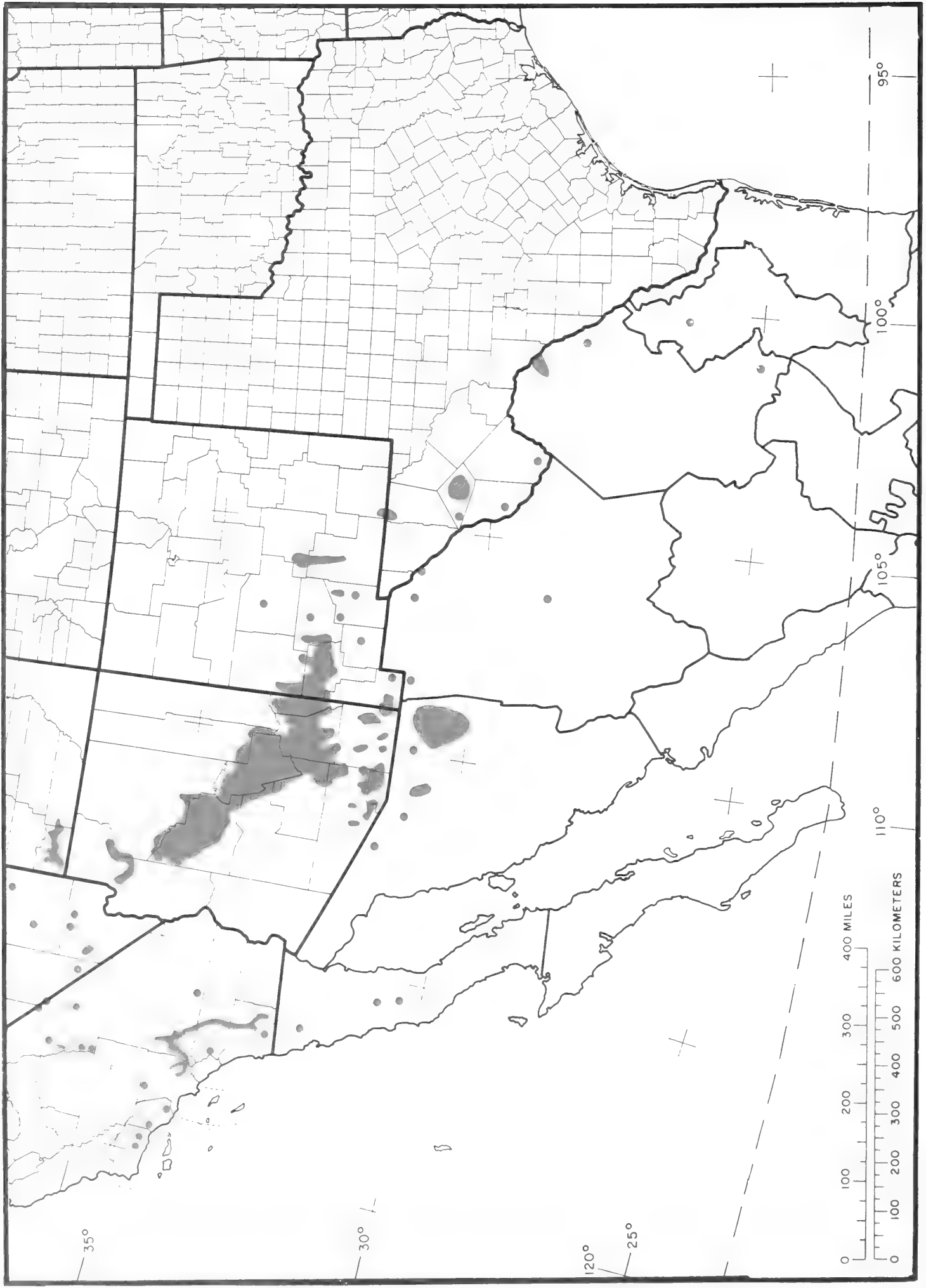
Map 80-SW. *Fraxinus greggii* A. Gray, Gregg ash. Southwestern Texas and Mexico.



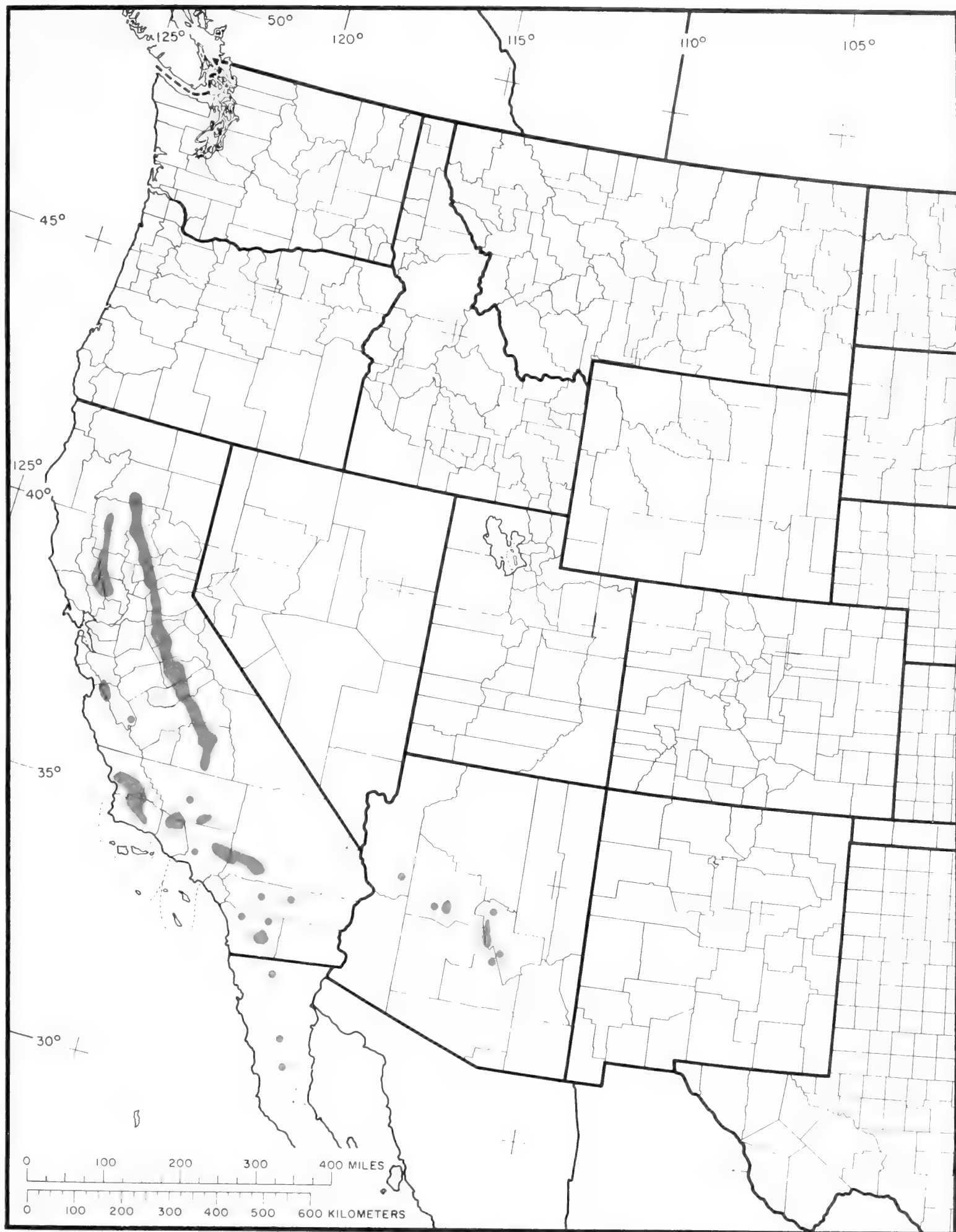
Map 81. *Fraxinus papillosa* Lingelsh., Chihuahua ash. Local in mountains of southeastern Arizona, southwestern New Mexico, Trans-Pecos Texas, and northern Mexico.



Map 82. *Fraxinus texensis* (A. Gray) Sarg., Texas ash. Southern Oklahoma and Texas only.



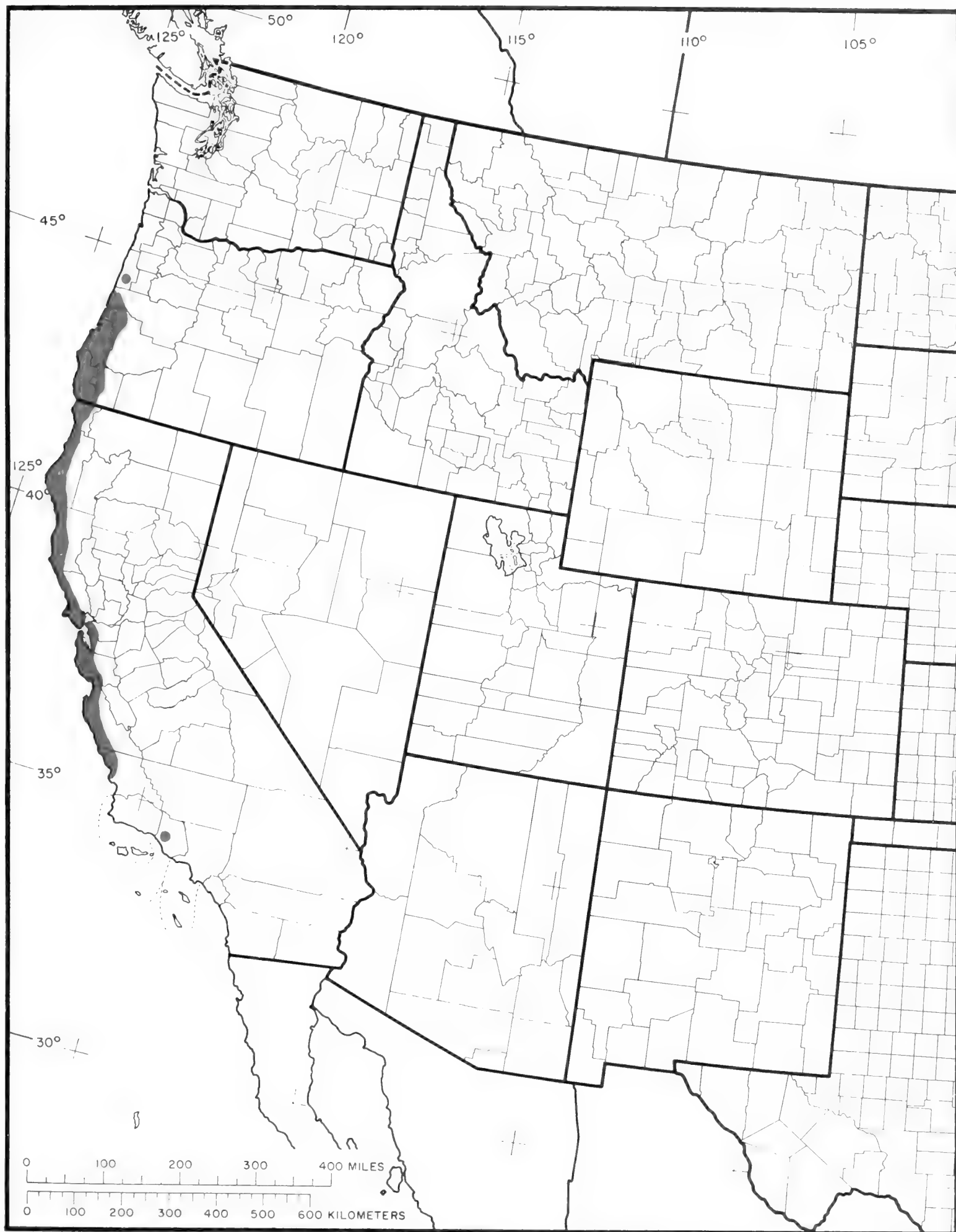
Map 83. *Fraxinus velutina* Torr., velvet ash.



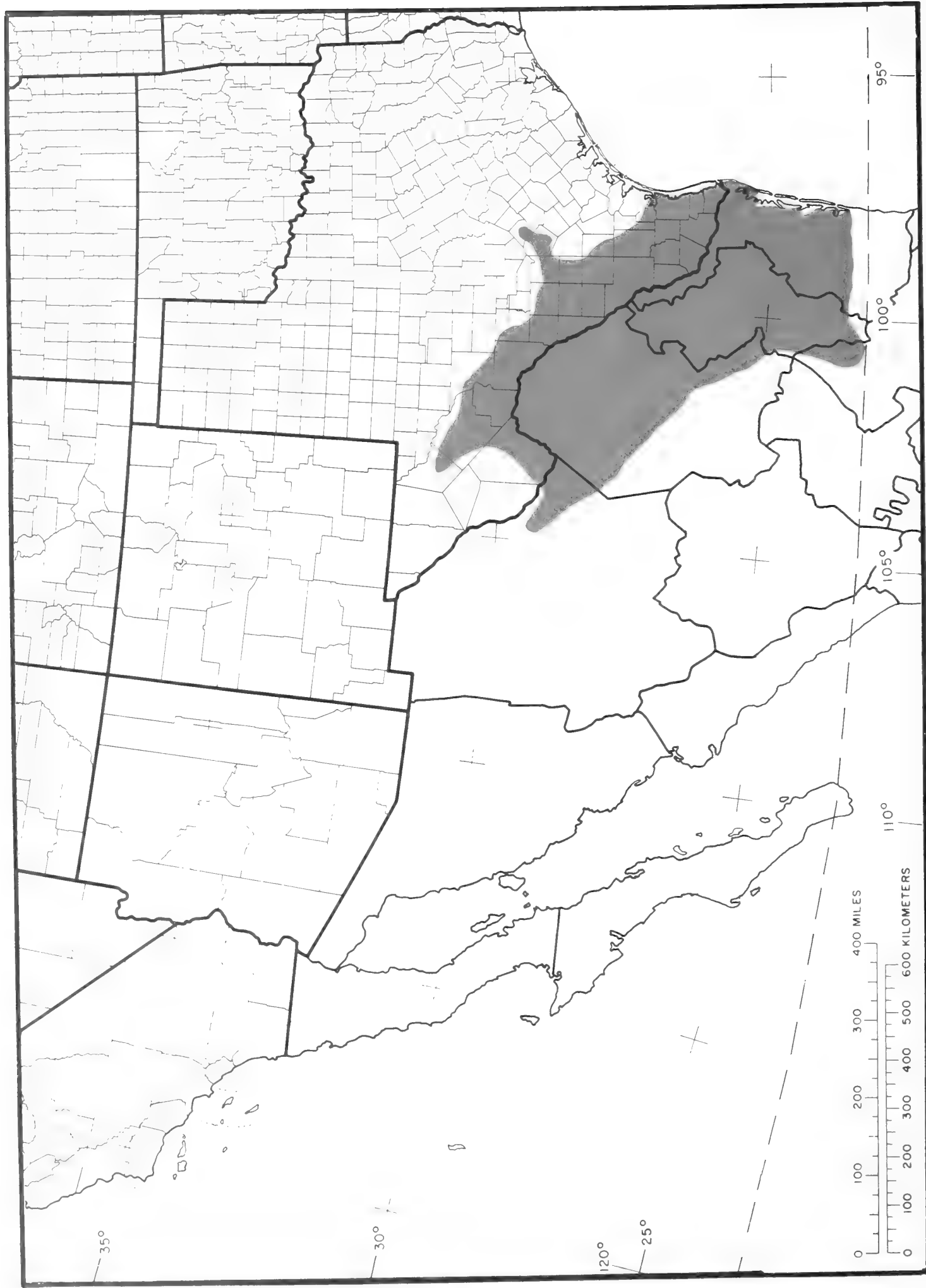
Map 84. *Fremontodendron californicum* (Torr.) Cov., *California fremontia*.



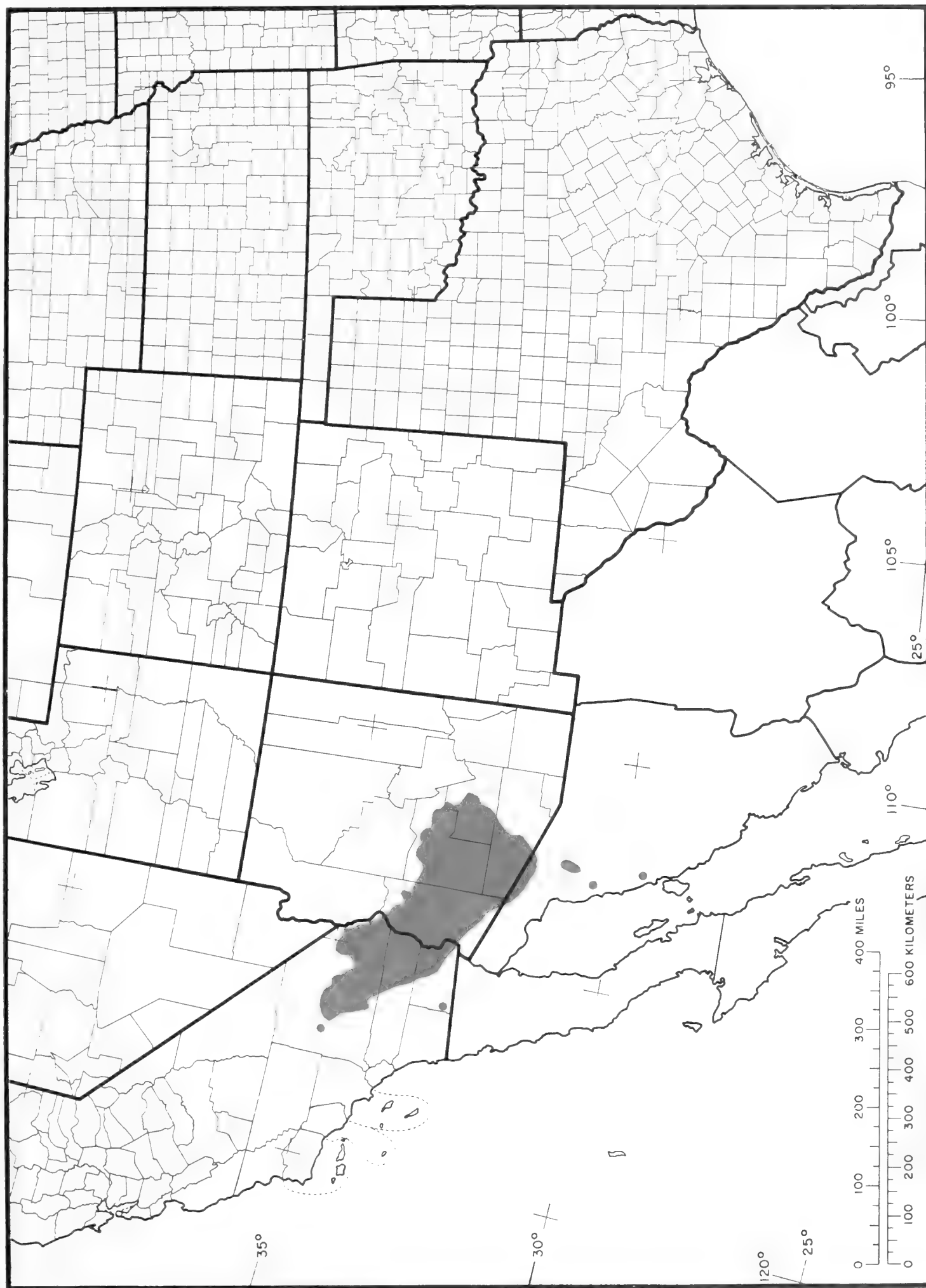
Map 85. *Fremontodendron mexicanum* (Davidson) Machr., Mexican fremontia. Extreme southern California and northern Baja California only.



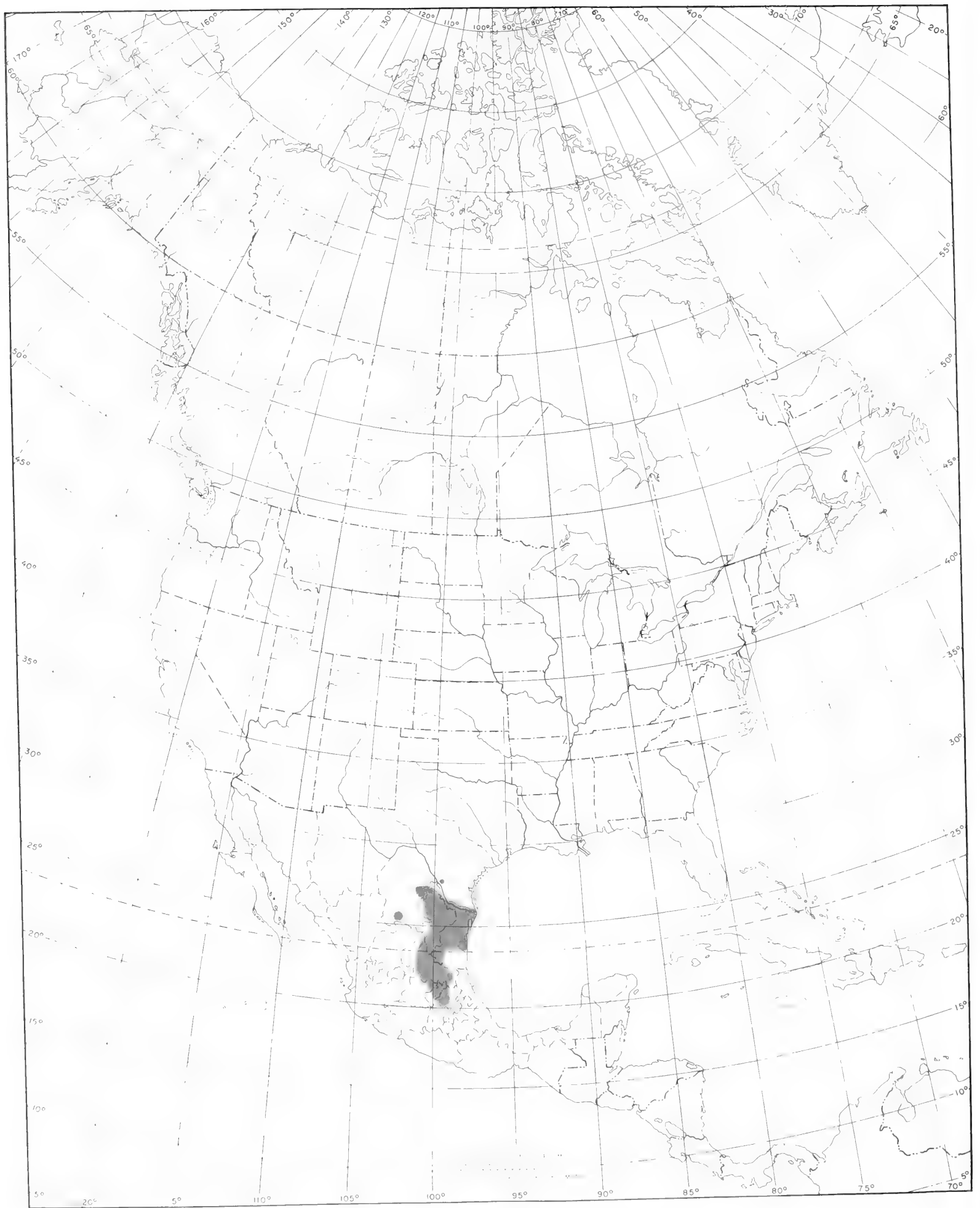
Map 86. *Garrya elliptica* Dougl., wavyleaf silktassel.



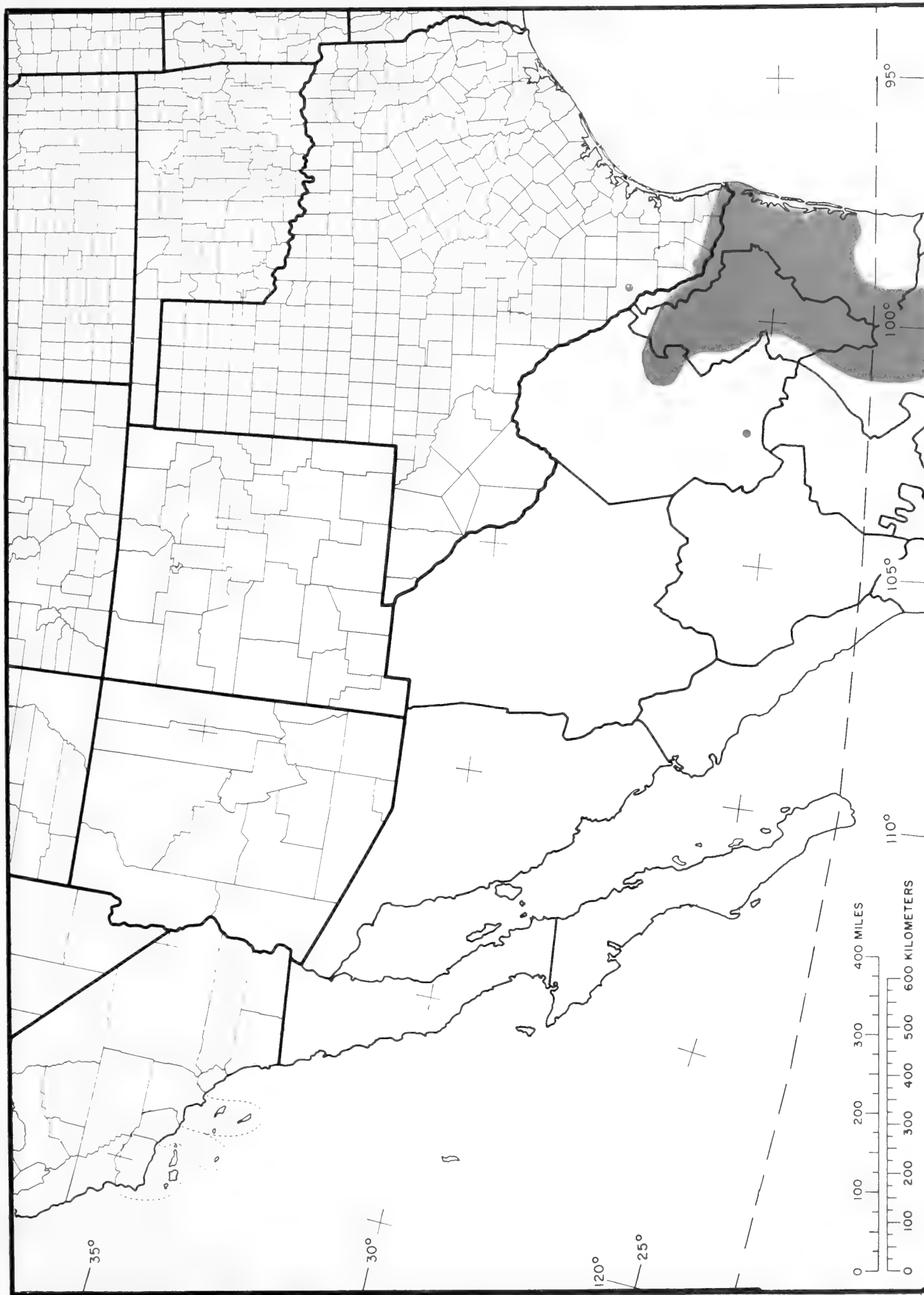
Map 87. *Guaiacum angustifolium* Engelm., *Texas lignumvitae*.



Map 88. *Holacantha emoryi* A. Gray, holacantha, Southern Arizona, southeastern California, and Sonora.



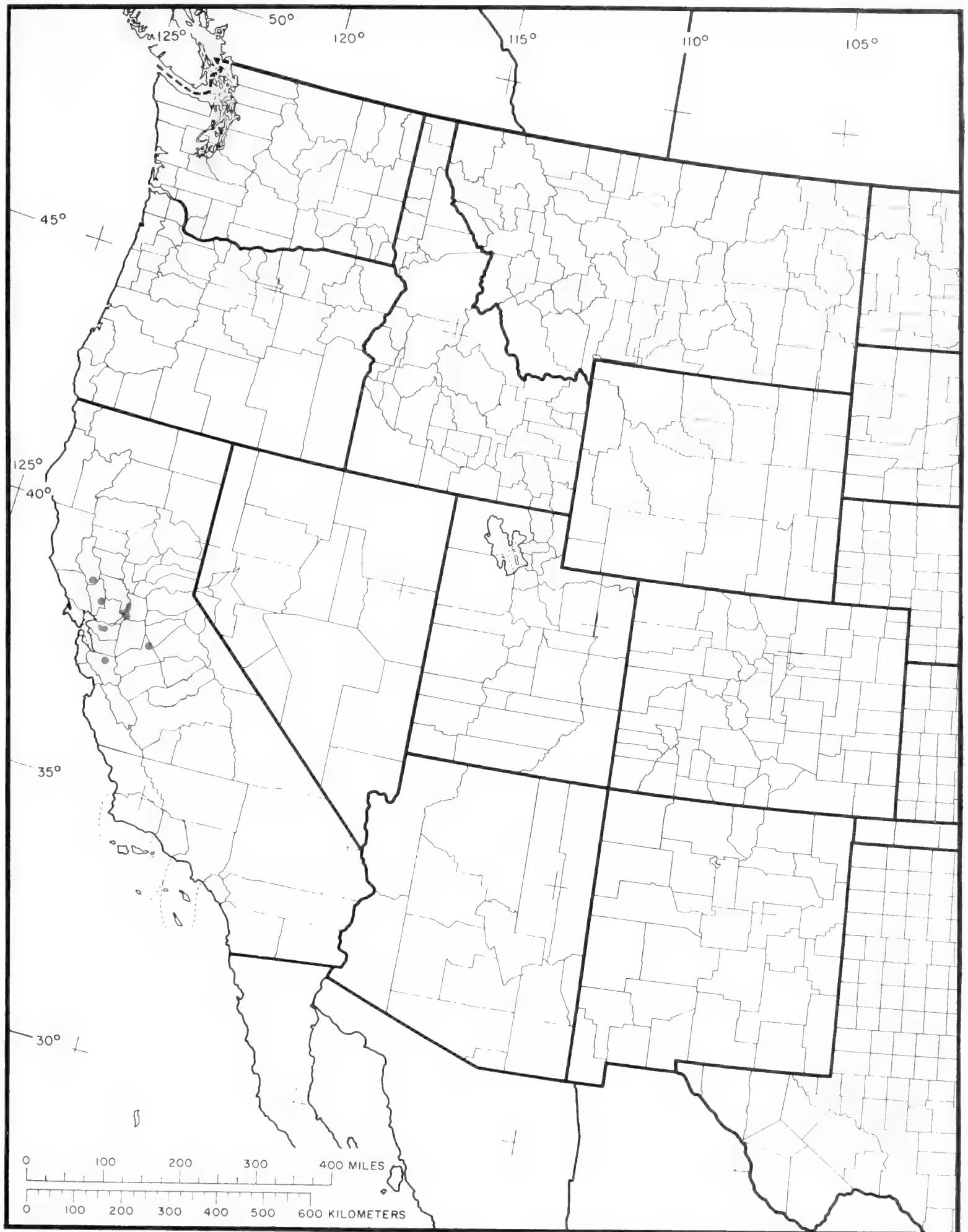
Map 89-N. *Helietta parvifolia* (A. Gray) Benth., barreta.



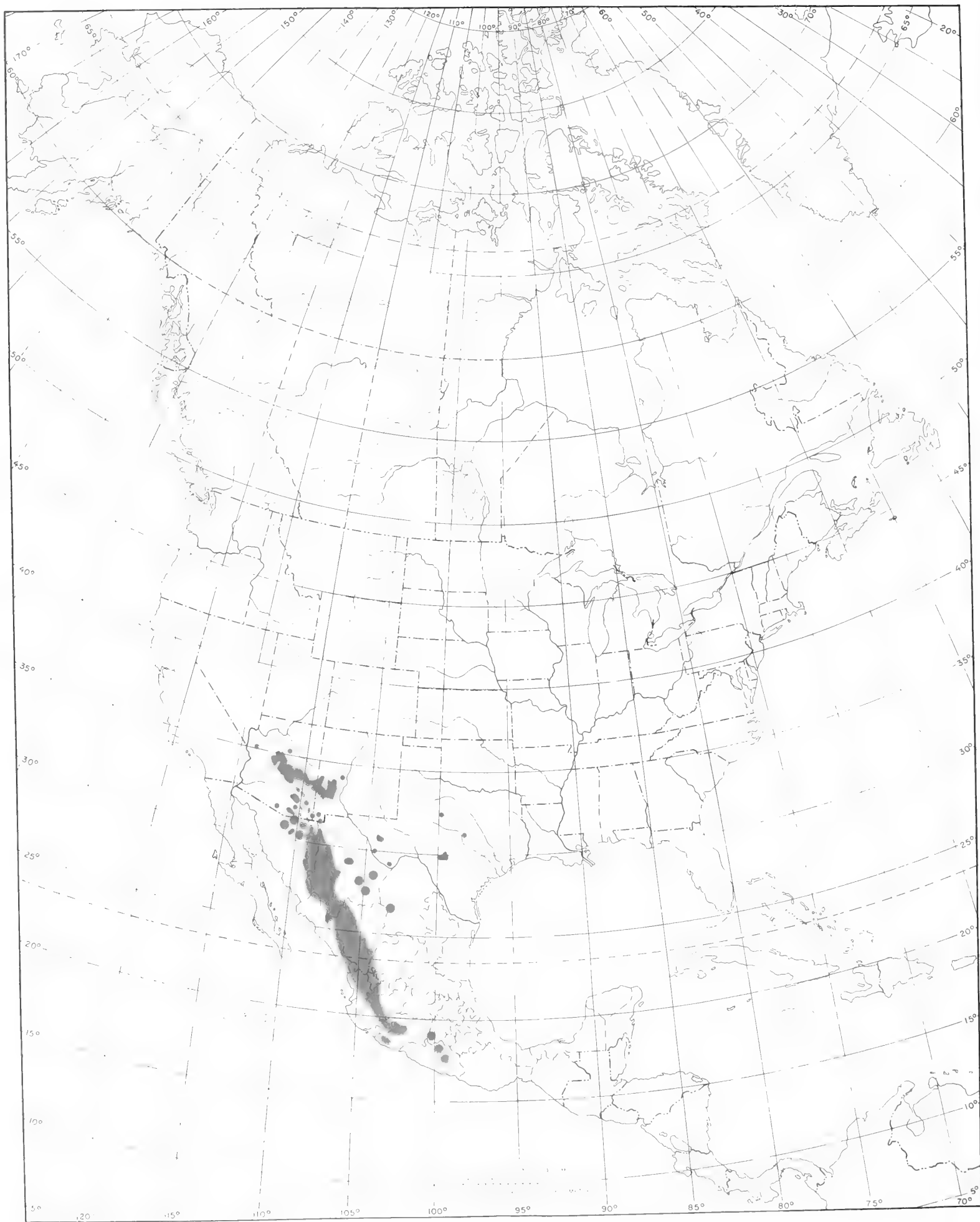
May 89-SW. *Helietta parvifolia* (A. Gray) Benth., barreta. Extreme southern Texas and Mexico.



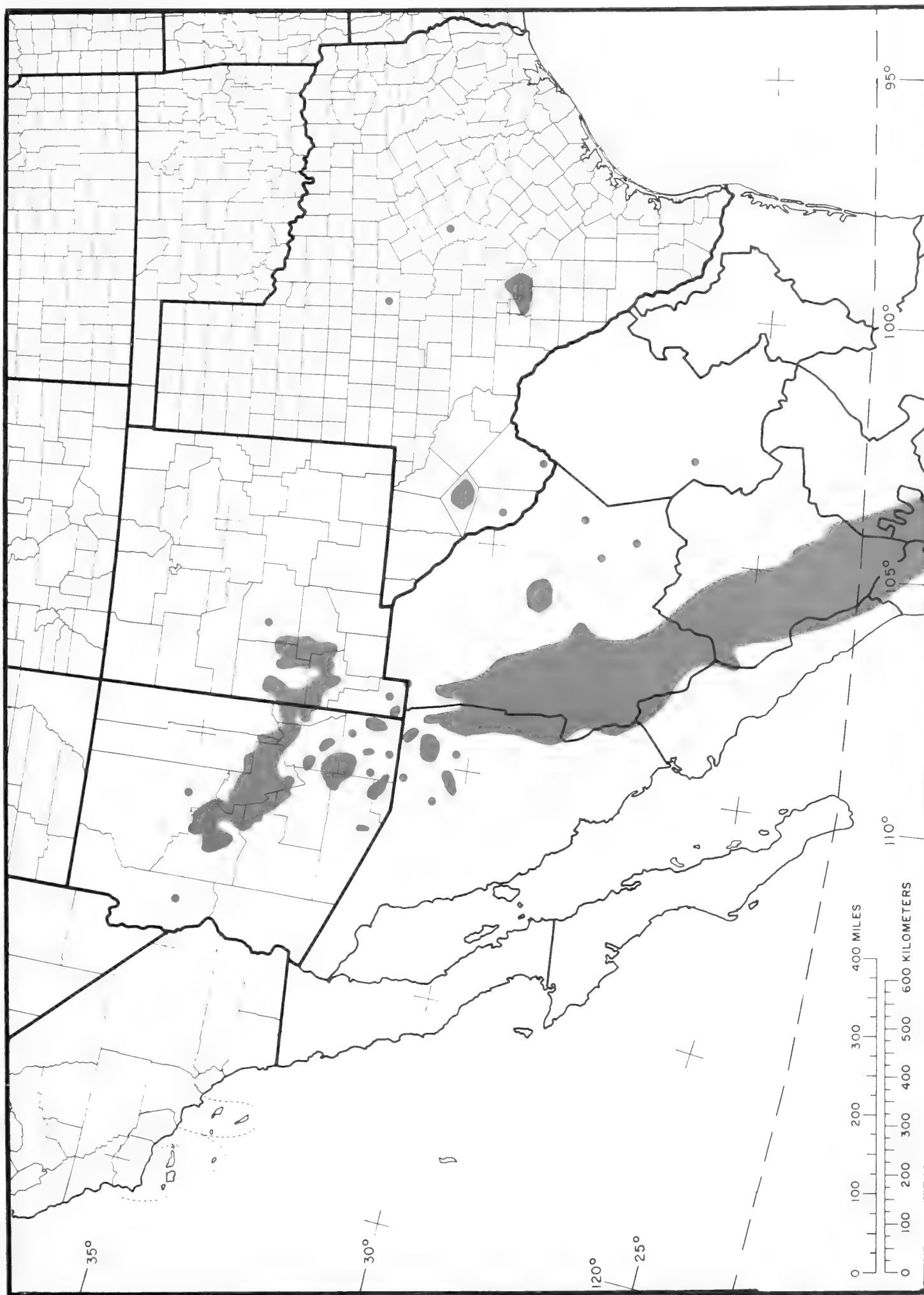
Map 90. *Juglans californica* S. Wats.. California walnut. Coastal southern California only.



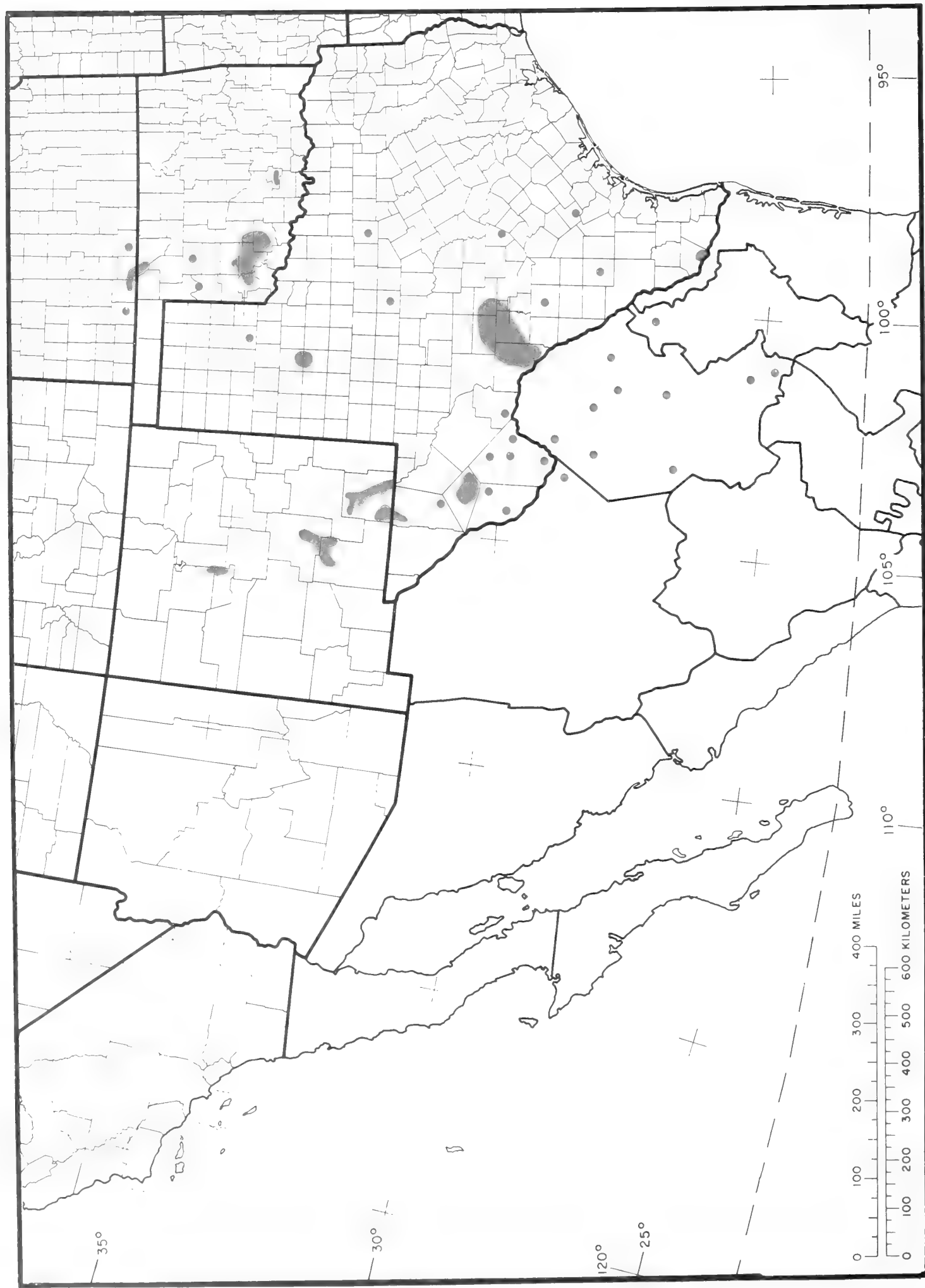
Map 91. *Juglans hindsii* Jeps., Hinds walnut. Central California only.



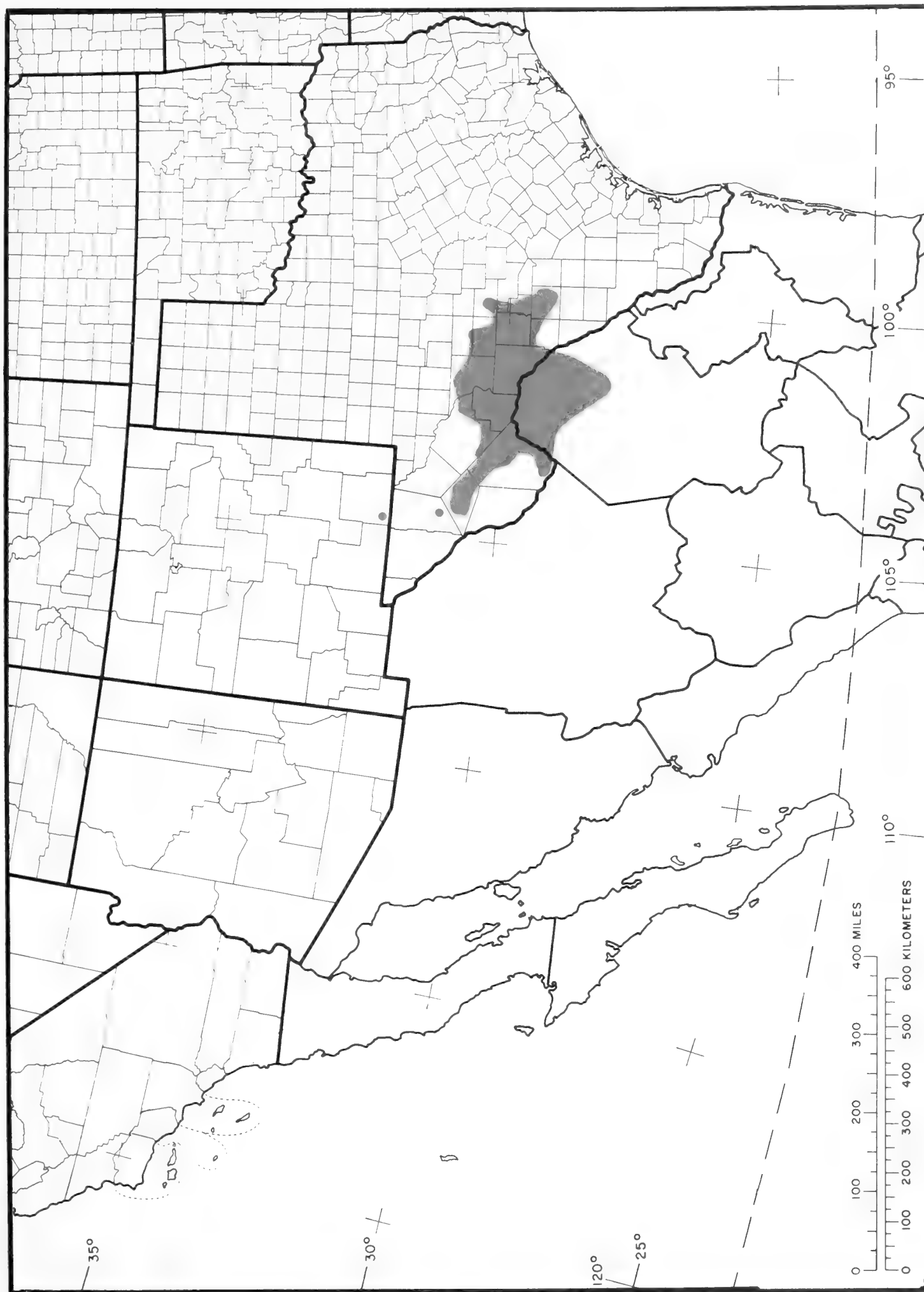
Map 92-N. *Juglans major* (Torr.) Heller, Arizona walnut.



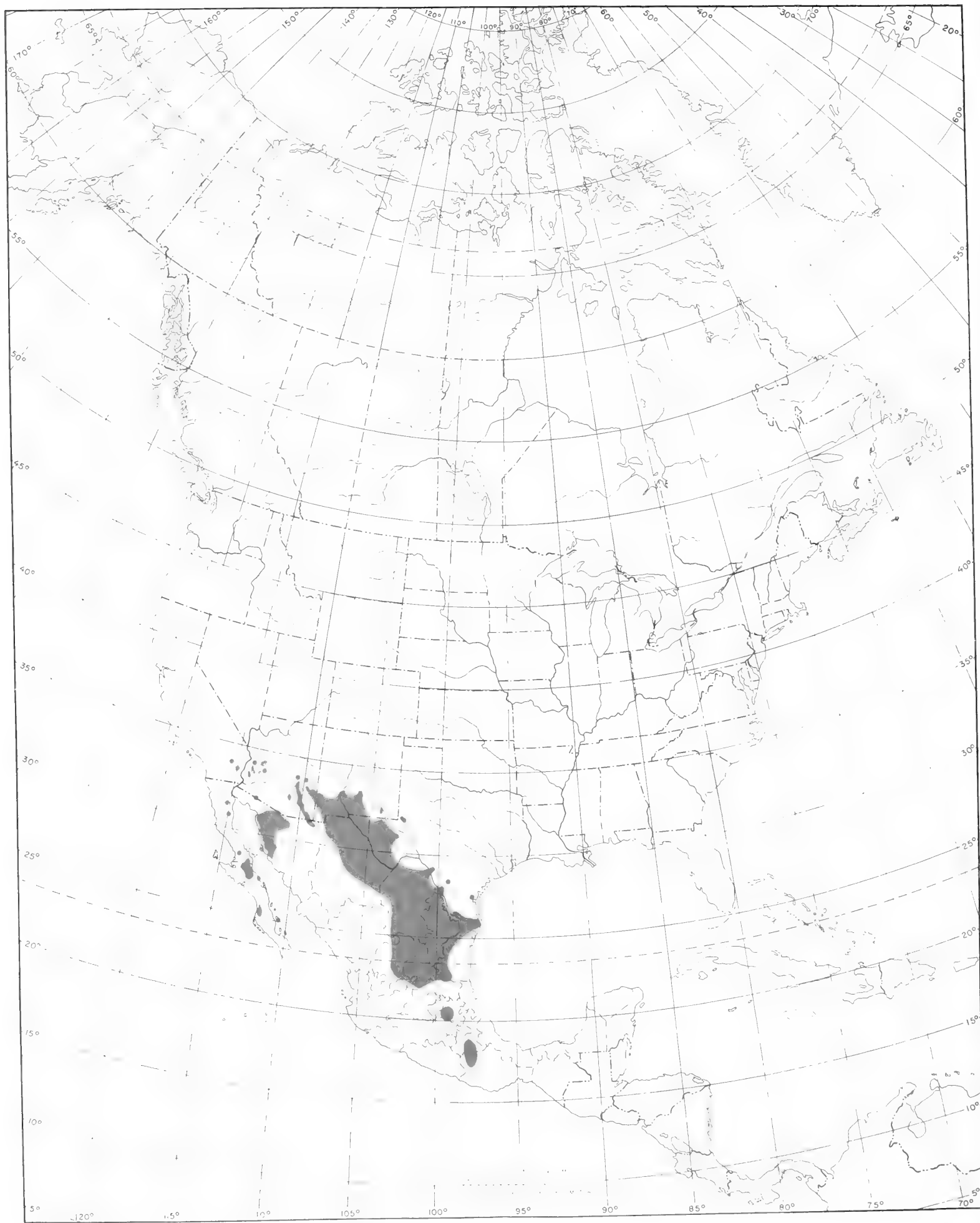
Map 92-SW. *Juglans major* (Torr.) Heller, Arizona walnut.



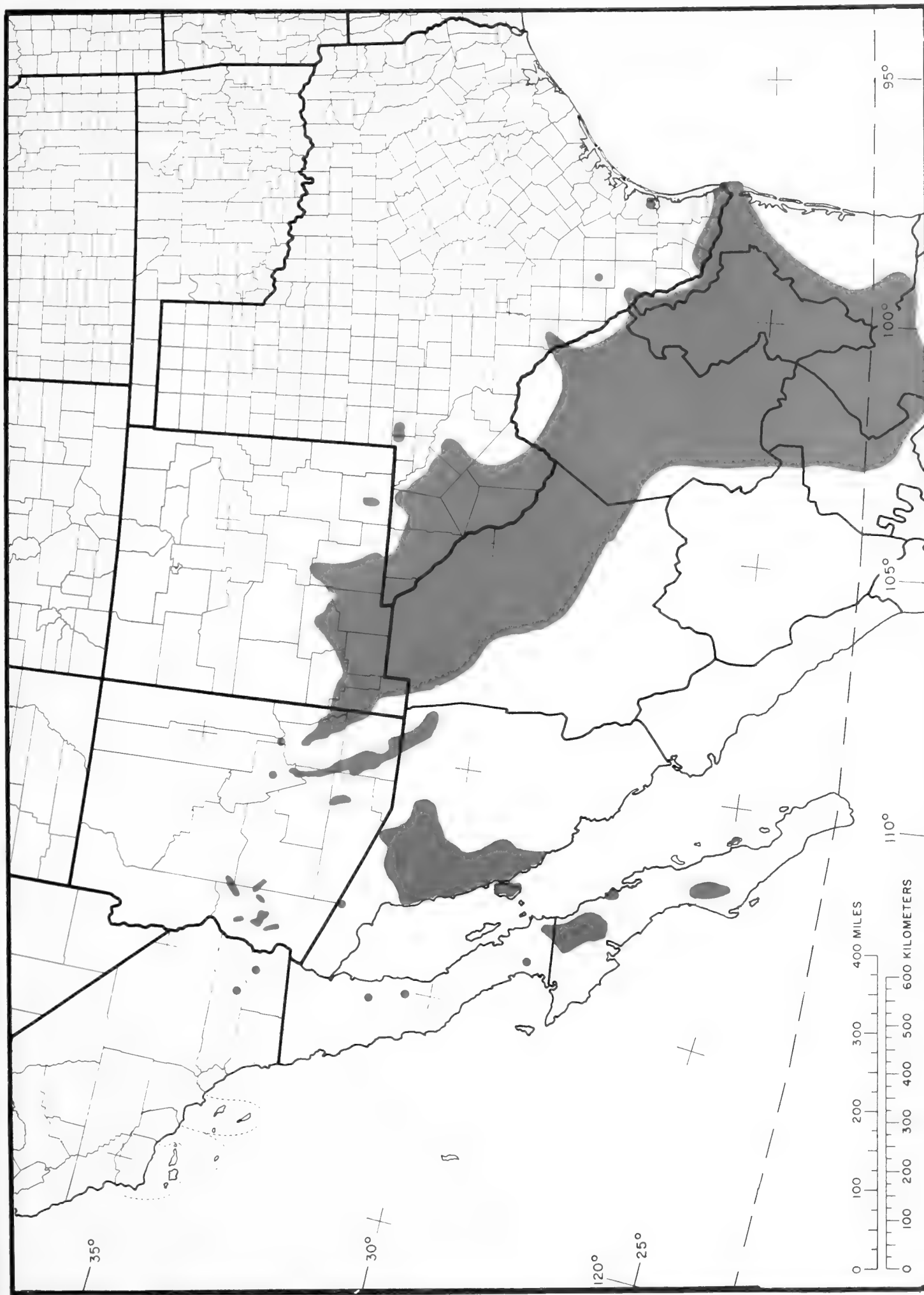
Map 93. *Juglans microcarpa* Berlandier, little walnut.



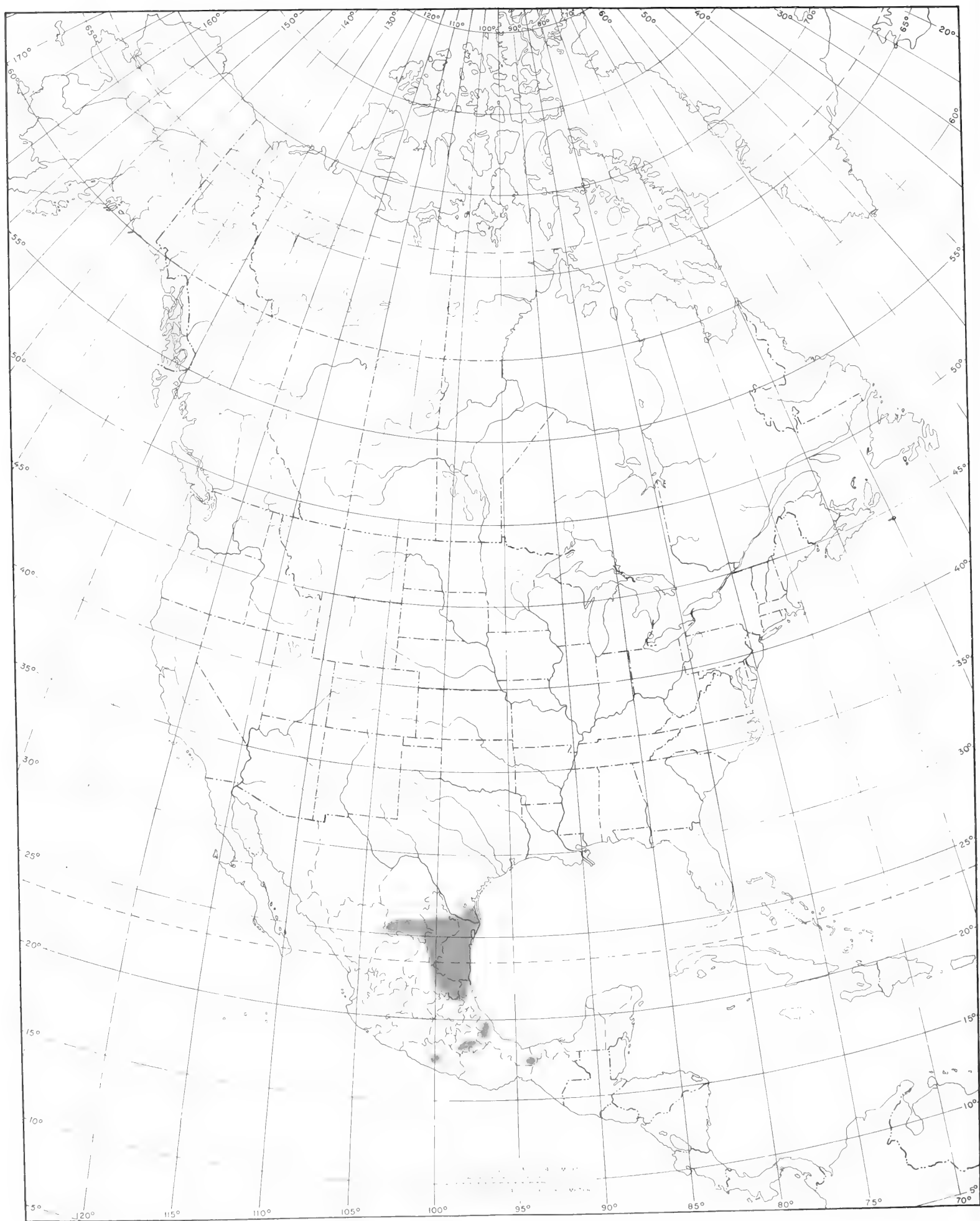
Map 94. *Leucaena retusa* Benth., littleleaf leadtree. Texas, southeastern New Mexico, and Coahuila only.



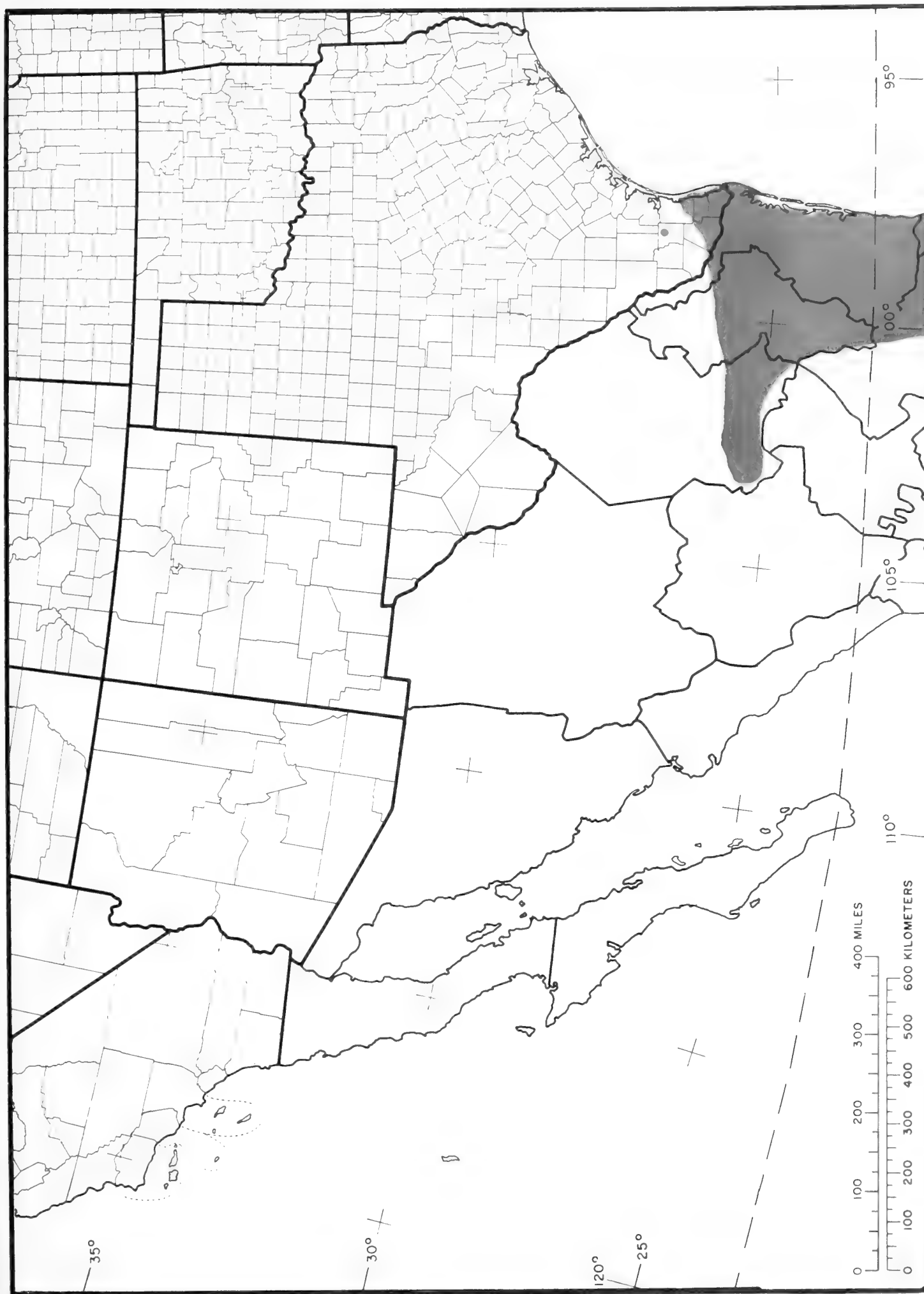
Map 95-N. *Koeberlinia spinosa* Zucc., allthorn. Also Bolivia.



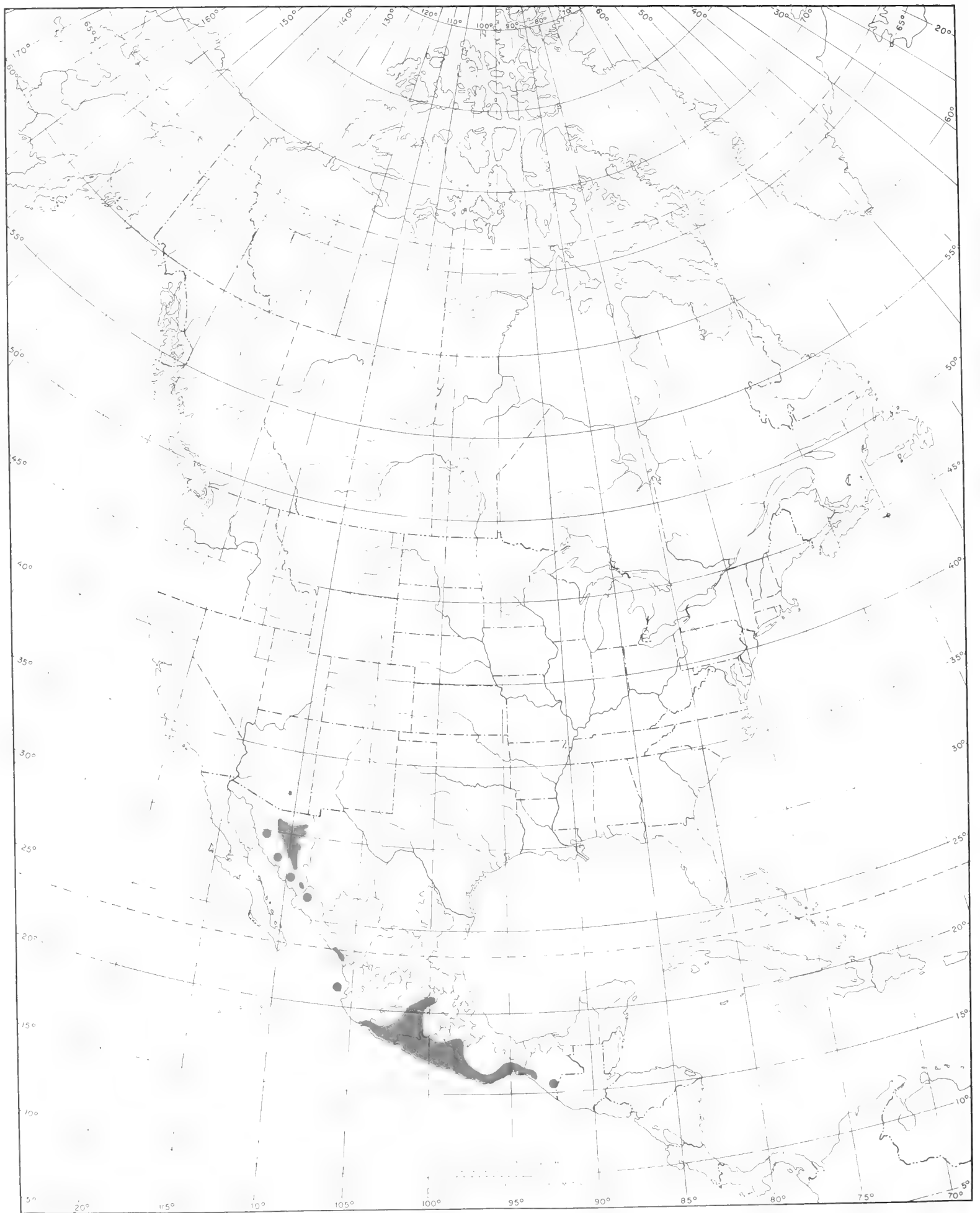
Map 95-SW. *Koeberlinia spinosa* Zucc., allthorn.



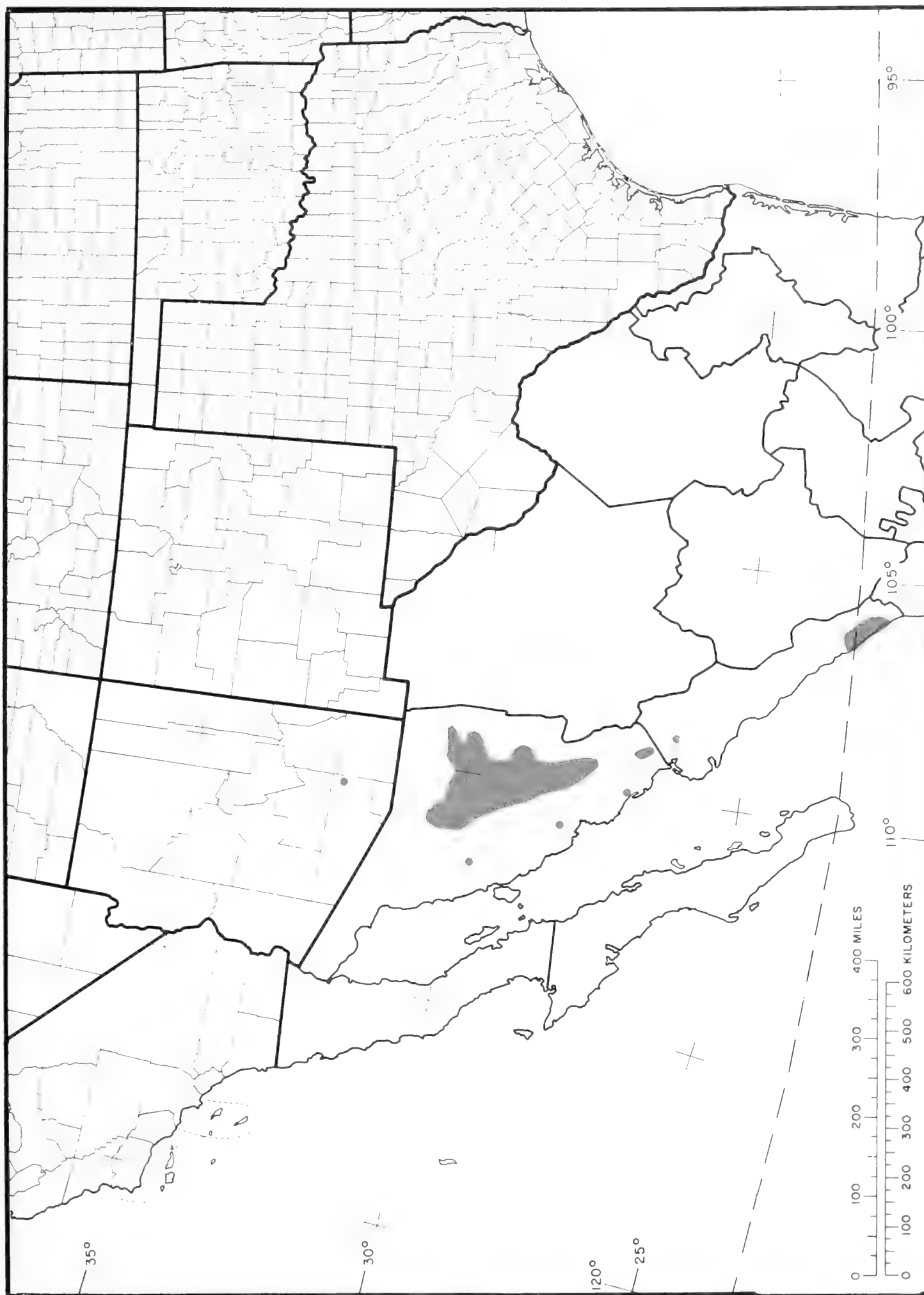
Map 96-N. *Leucaena pulverulenta* (Schlecht.) Benth., great leadtree.



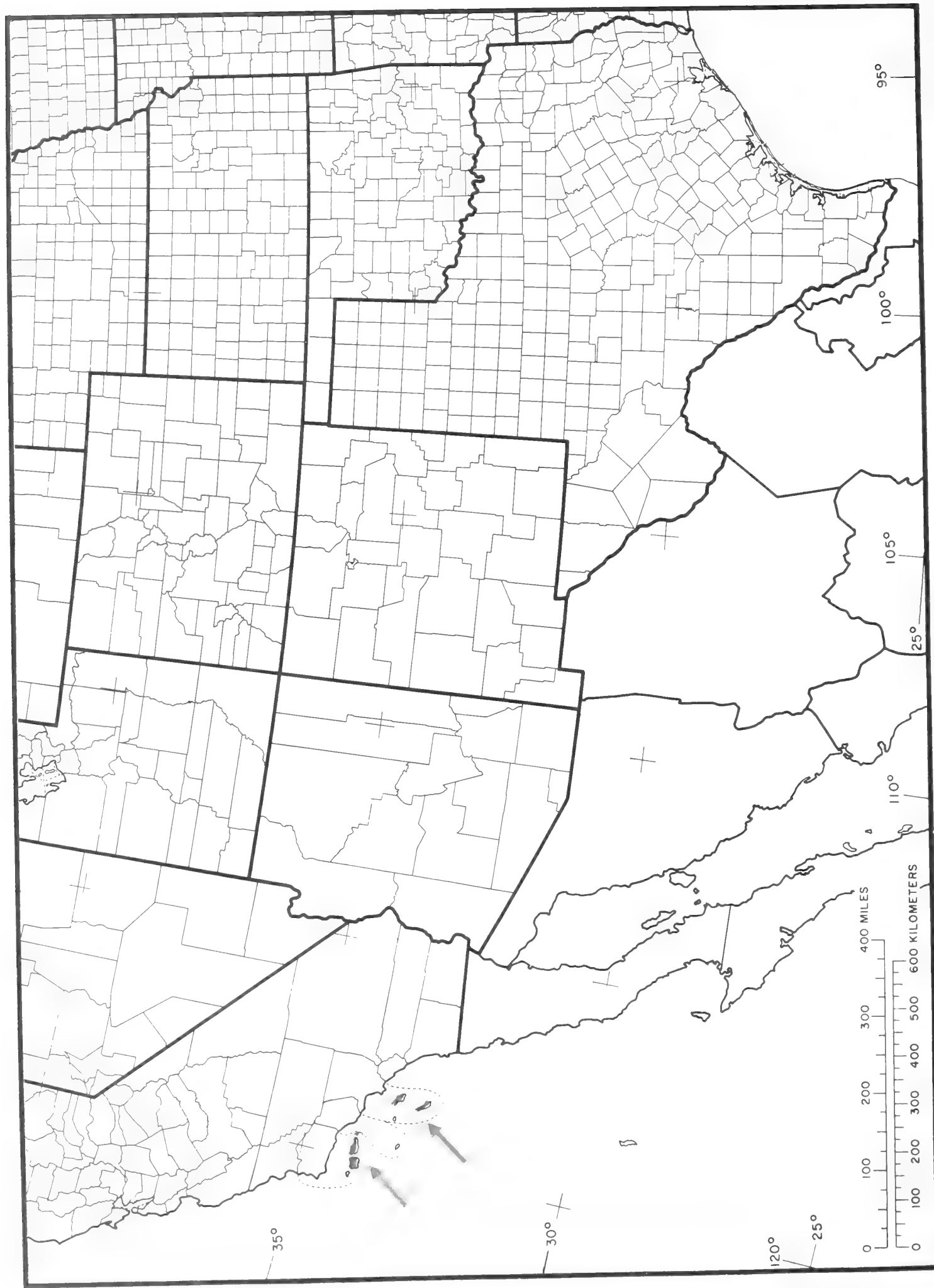
Map 96-SW. *Leucaena pulverulenta* (Schlecht.) Benth., great leadtree. Extreme southern Texas and Mexico.



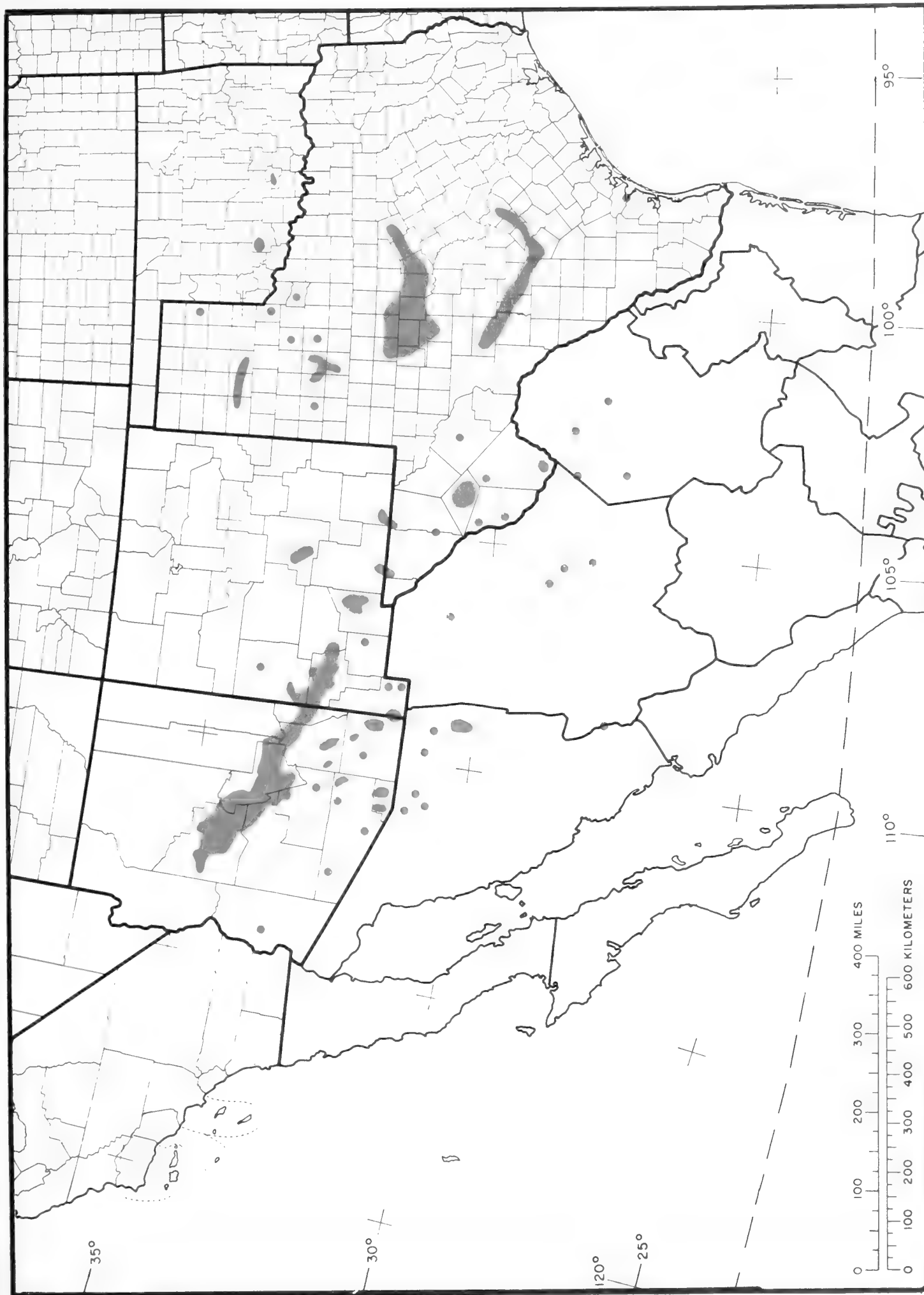
Map 97-N. *Lysiloma microphylla* Benth., littleleaf lysiloma.



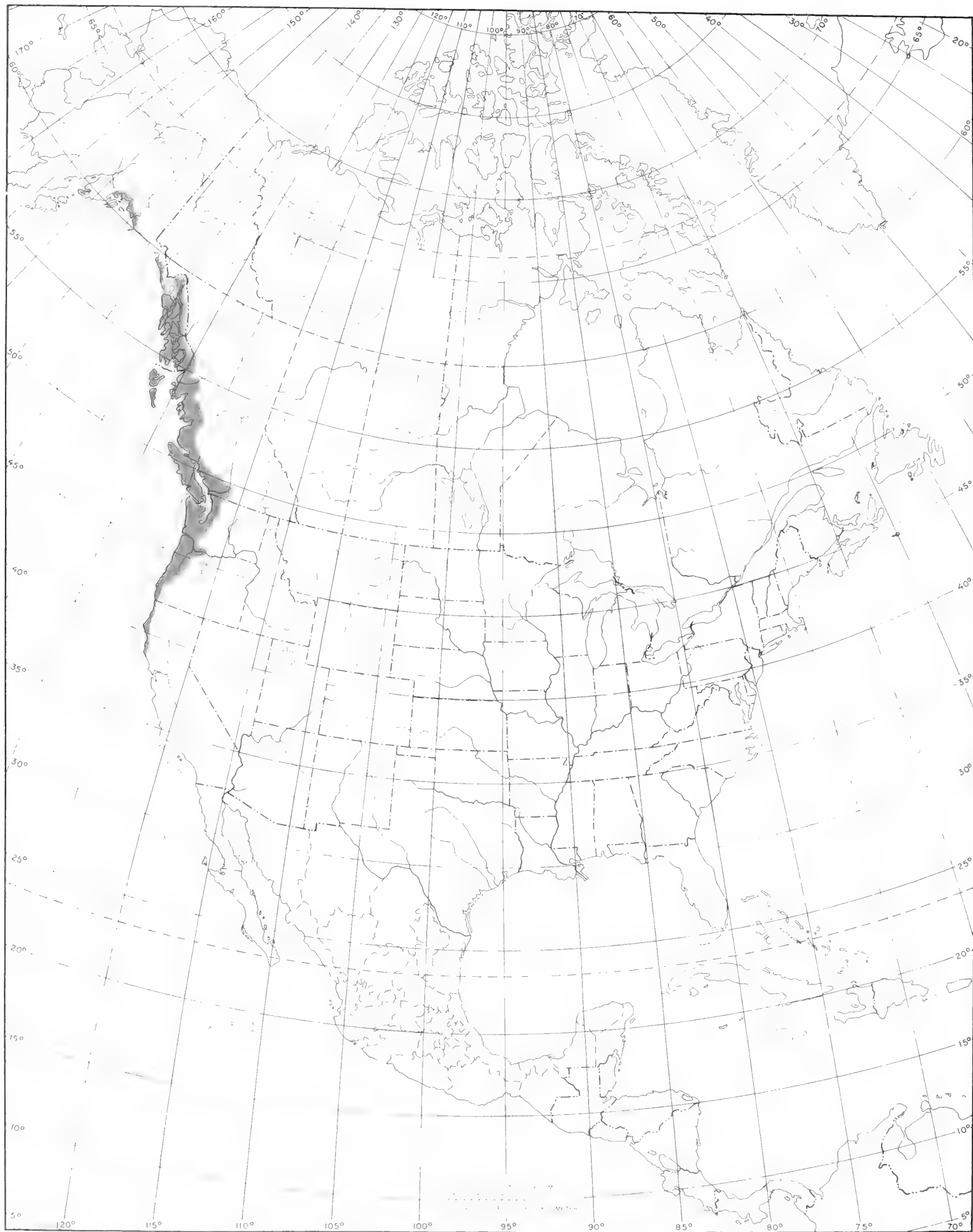
Map 97-SW. *Lysiloma microphylla* Benth., littleleaf lysiloma. Southeastern Arizona (1 locality) and Mexico.



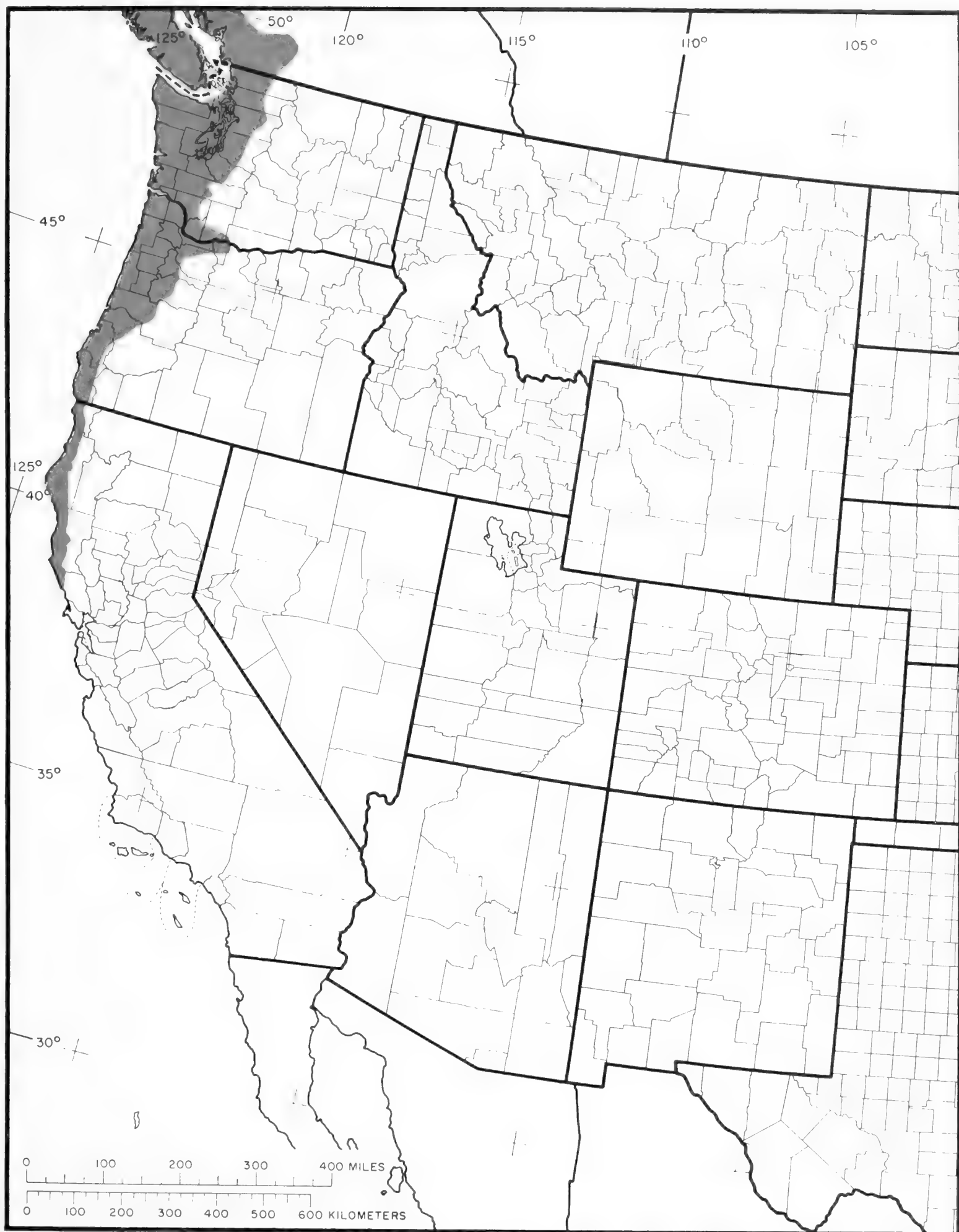
Map 98. *Lyonothamnus floribundus* A. Gray, Lyontree, Santa Rosa, Santa Cruz, Santa Catalina, and San Clemente Islands of California only.



Map 99. *Morus microphylla* Buckl., Texas mulberry.



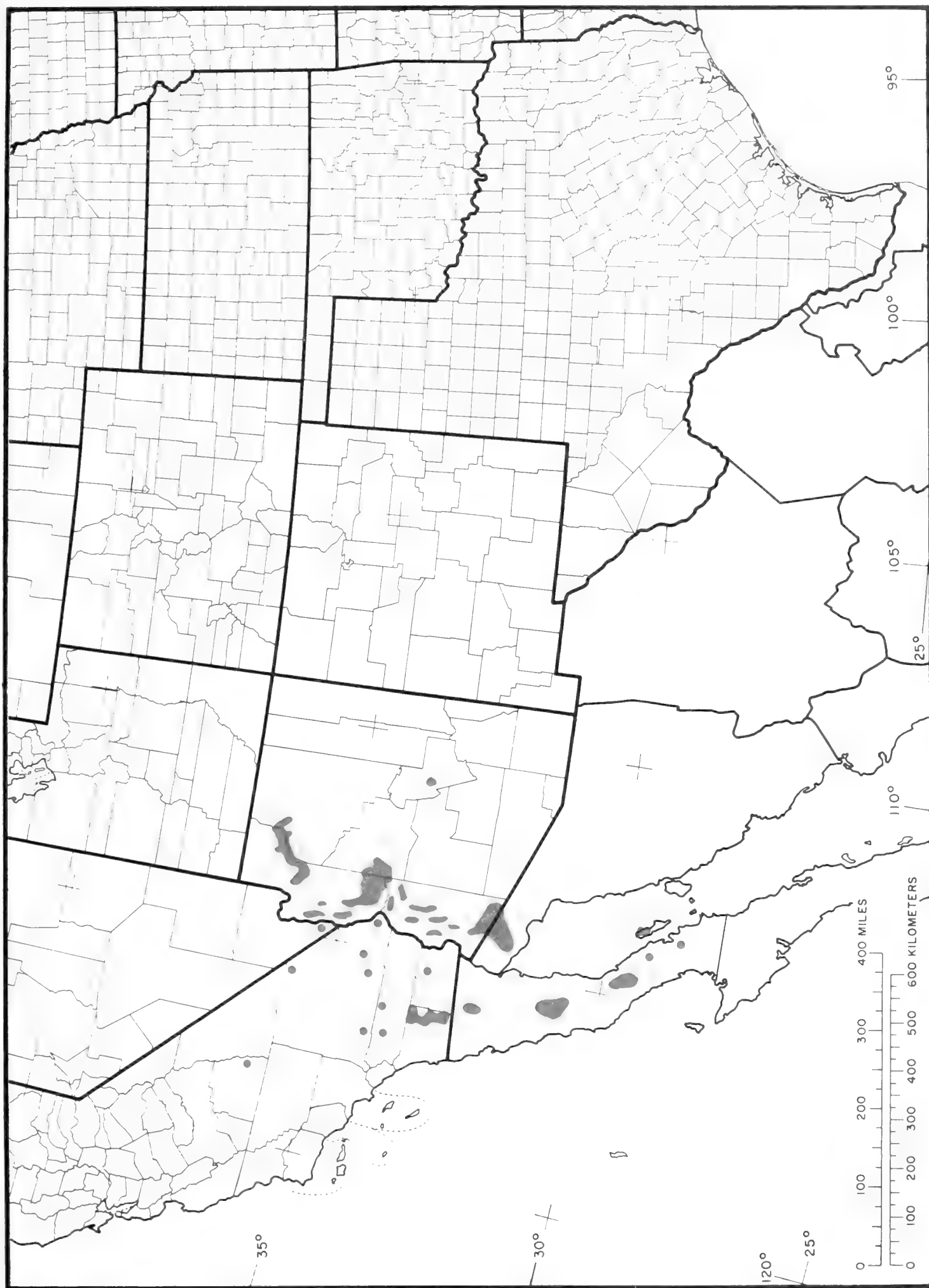
Map 100-N. *Malus diversifolia* (Bong.) Roem., Oregon crab apple.



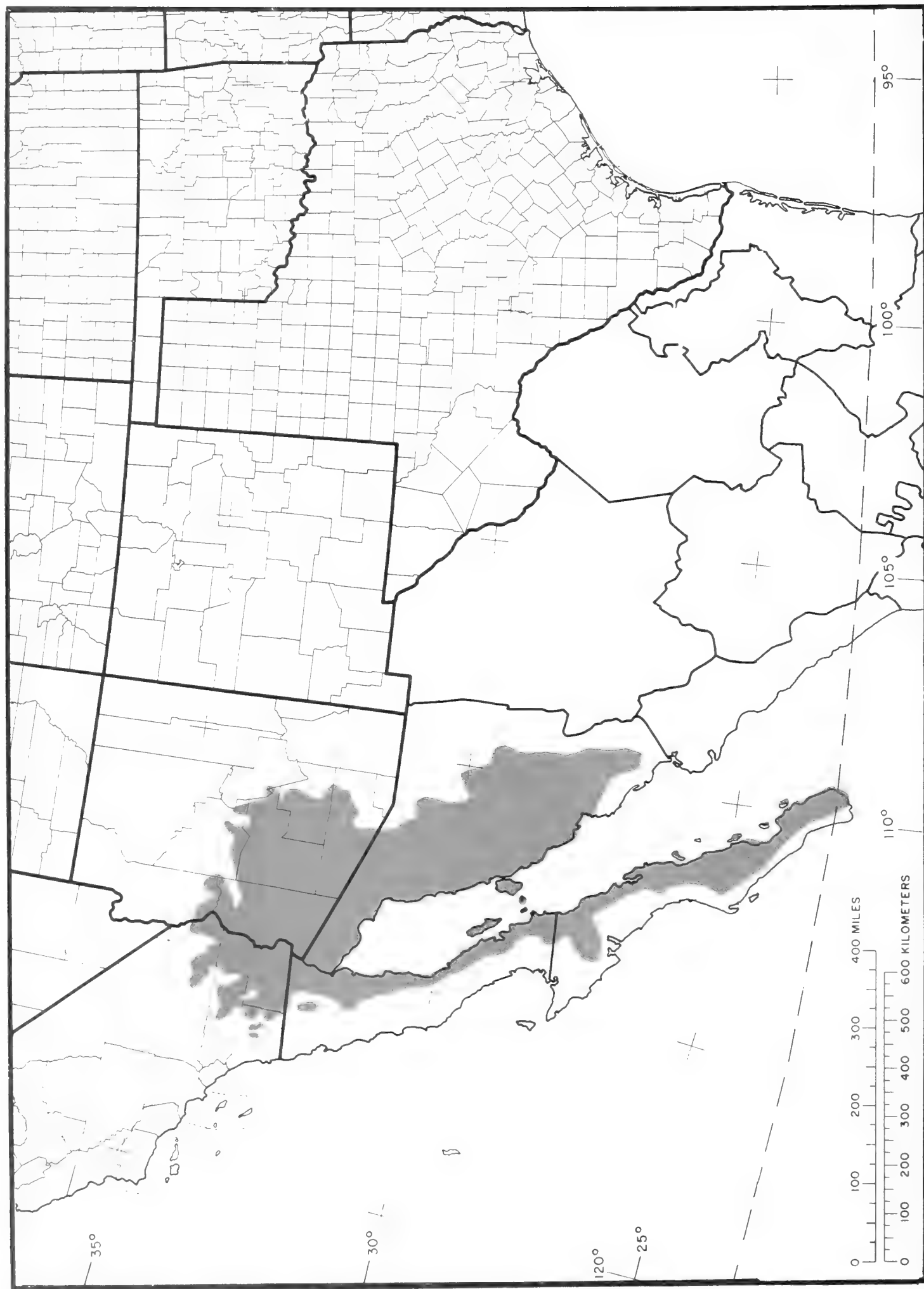
Map 100-W. *Malus diversifolia* (Bong.) Roem., Oregon crab apple.



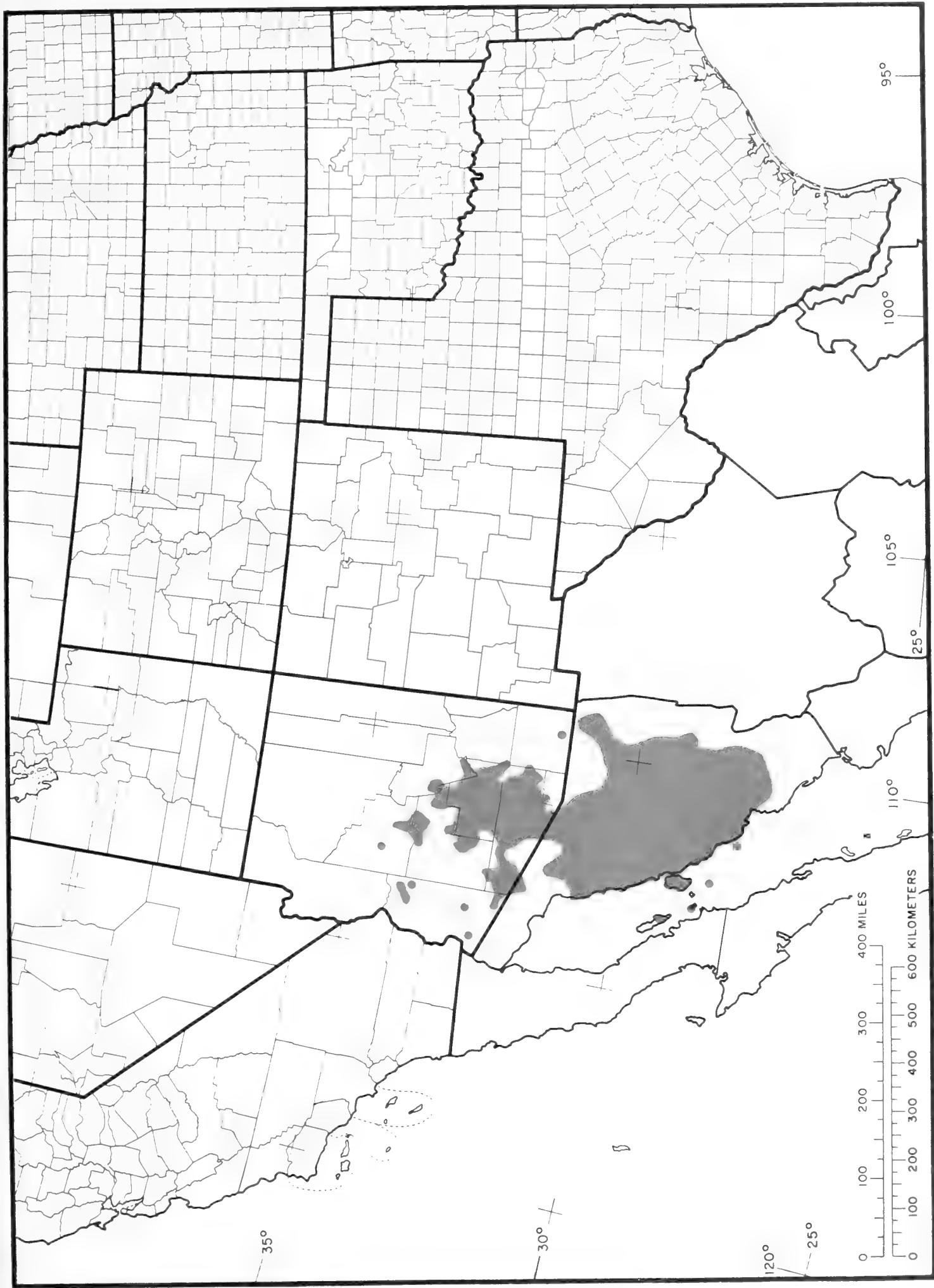
Map 101. *Myrica californica* Cham., Pacific bayberry.



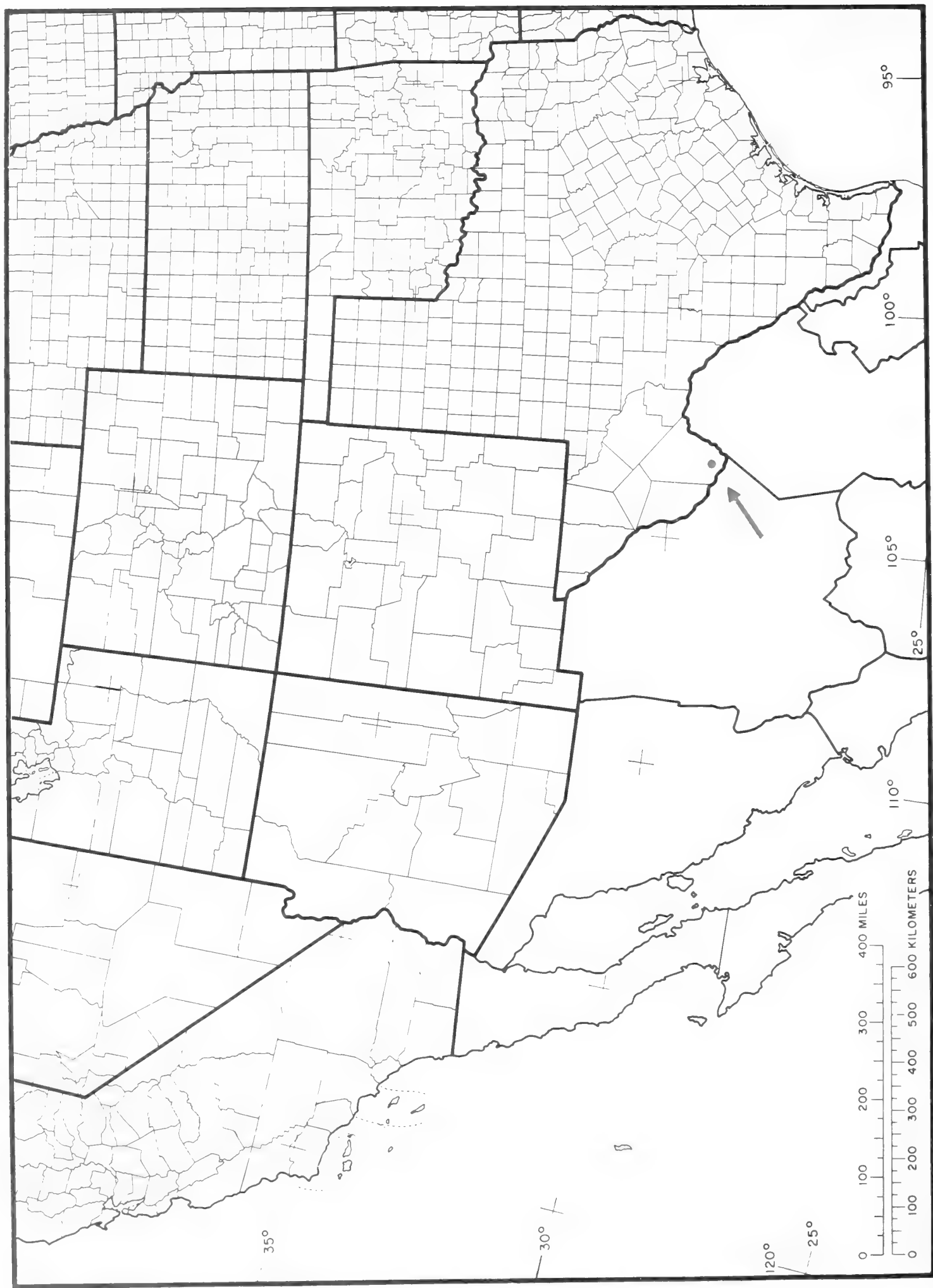
Map 102. *Nolina bigelovii* (Torr.) S. Wats., Bigelow nolina.



Map 103. *Olneya tesota* A. Gray, tesota.



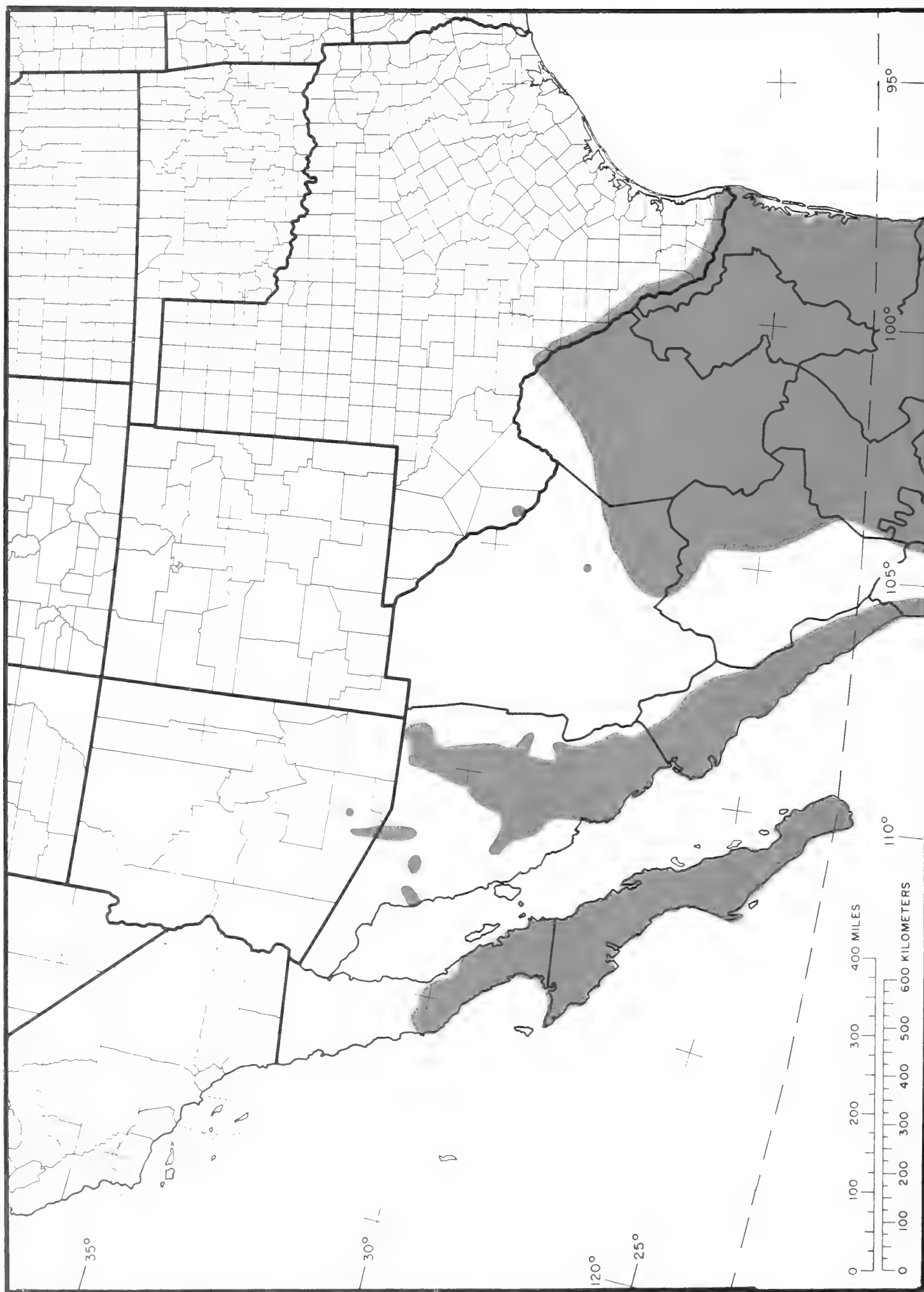
Map 104. *Opuntia fulgida* Engelm., jumping cholla. Arizona, Sonora, and islands westward.



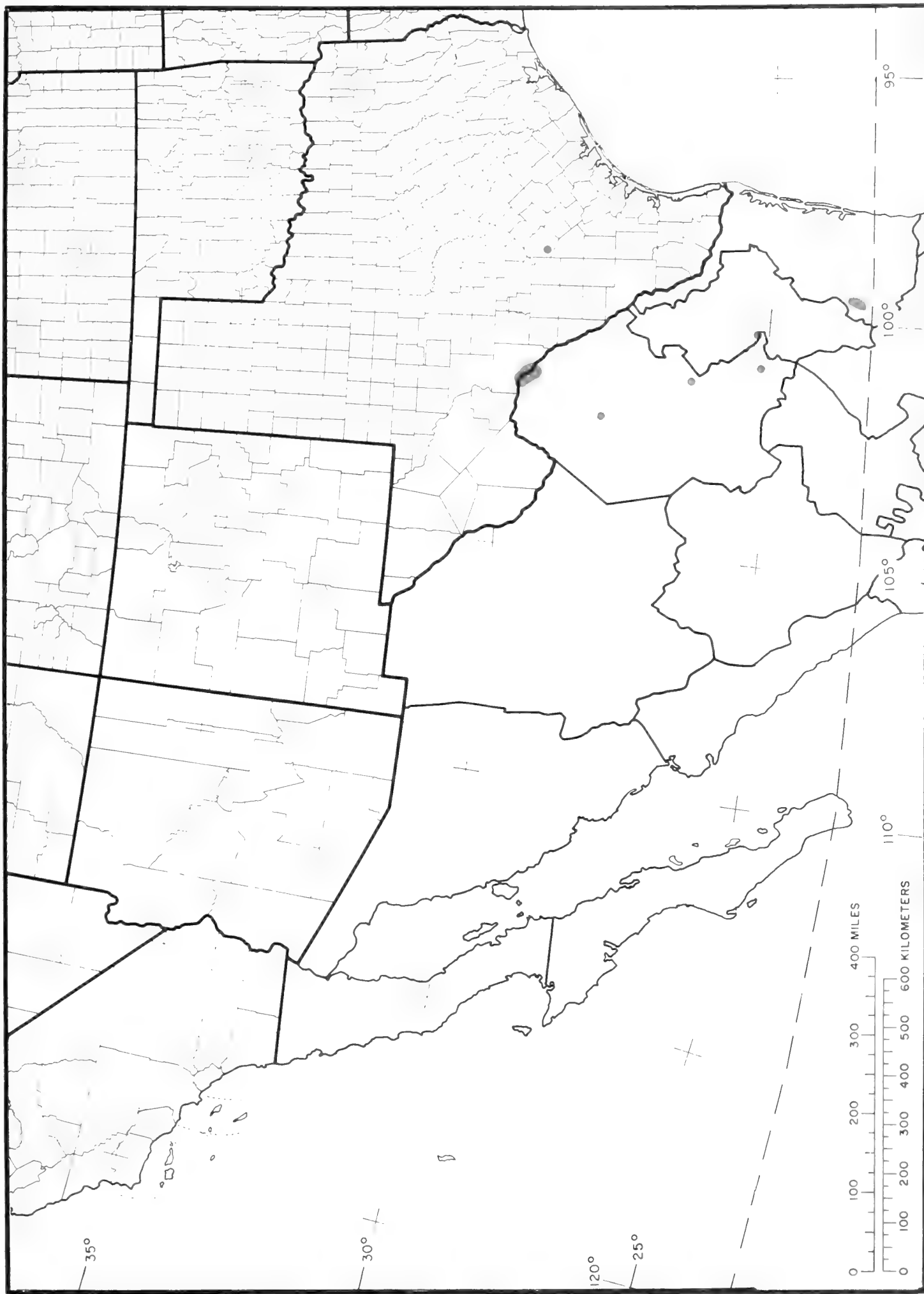
Map 105. *Ostrya chisosensis* Correll, Chisos hophornbeam. Chisos Mountains, Texas, only.



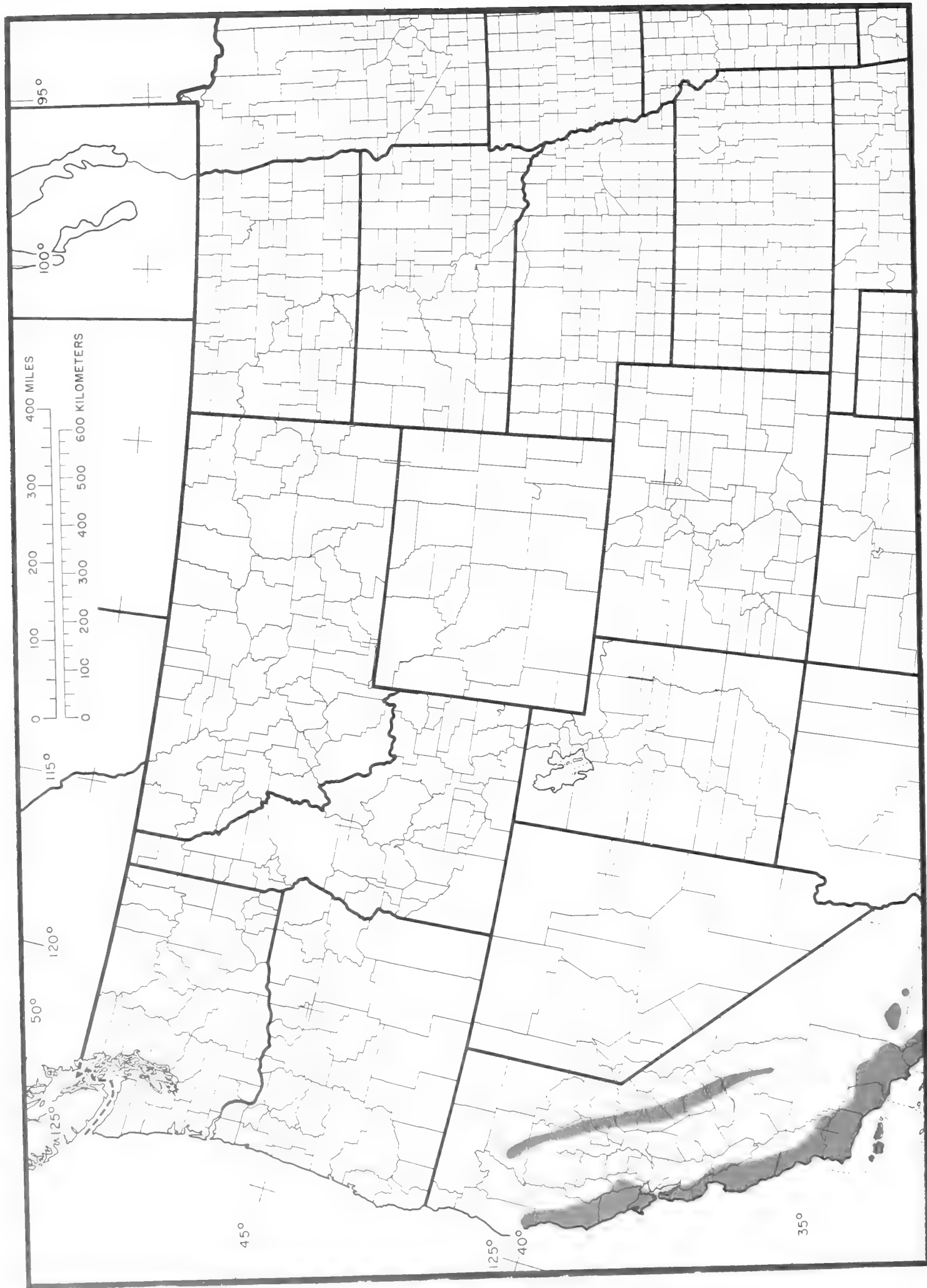
Map 106. *Ostrya knowltonii* Cov., Knowlton hophornbeam.



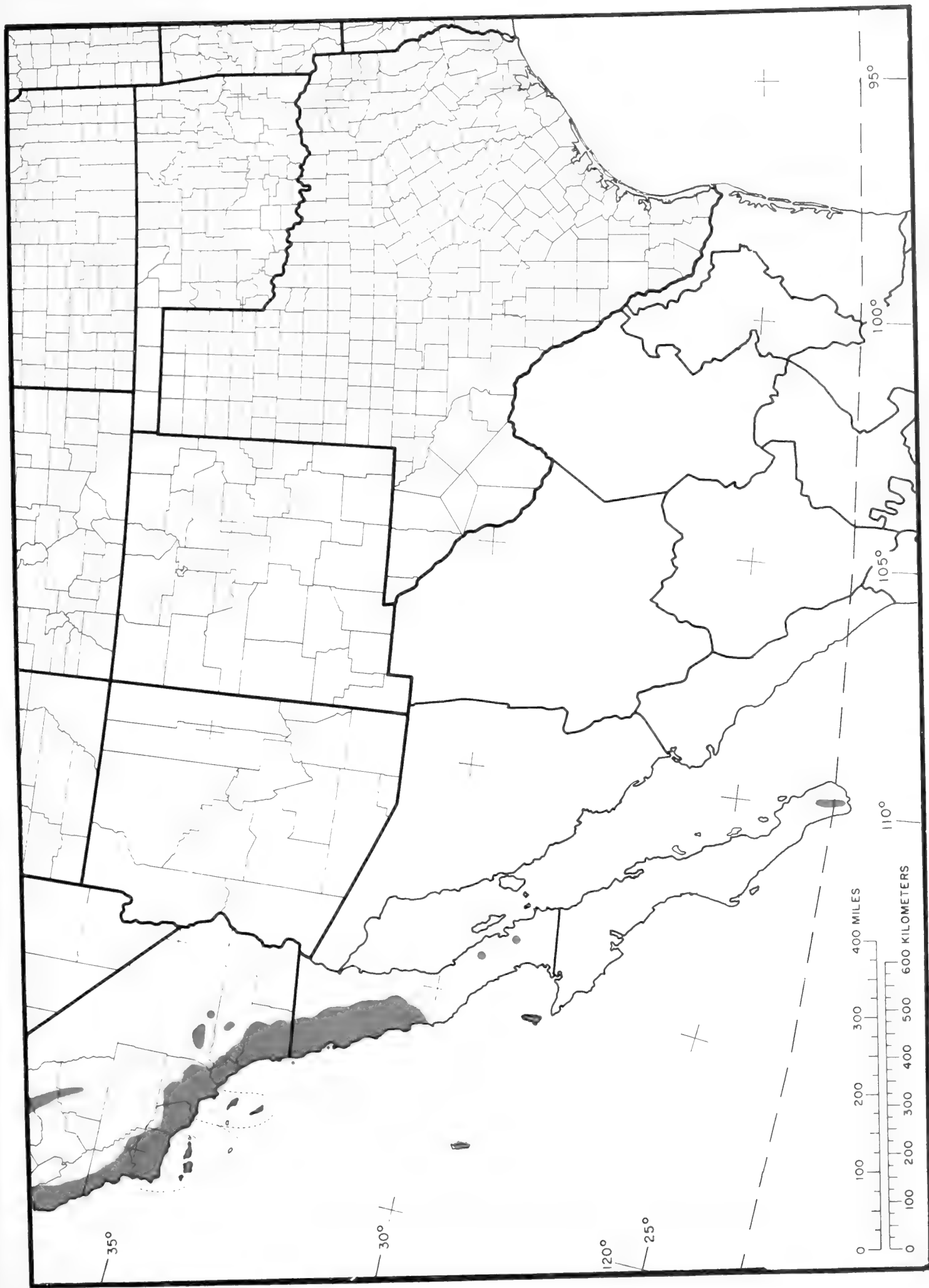
Map 107. *Parkinsonia aculeata* L., Jerusalem-thorn. Widely distributed in tropical America (not mapped), also cultivated and naturalized northward in Southeastern United States and in Old World tropics.



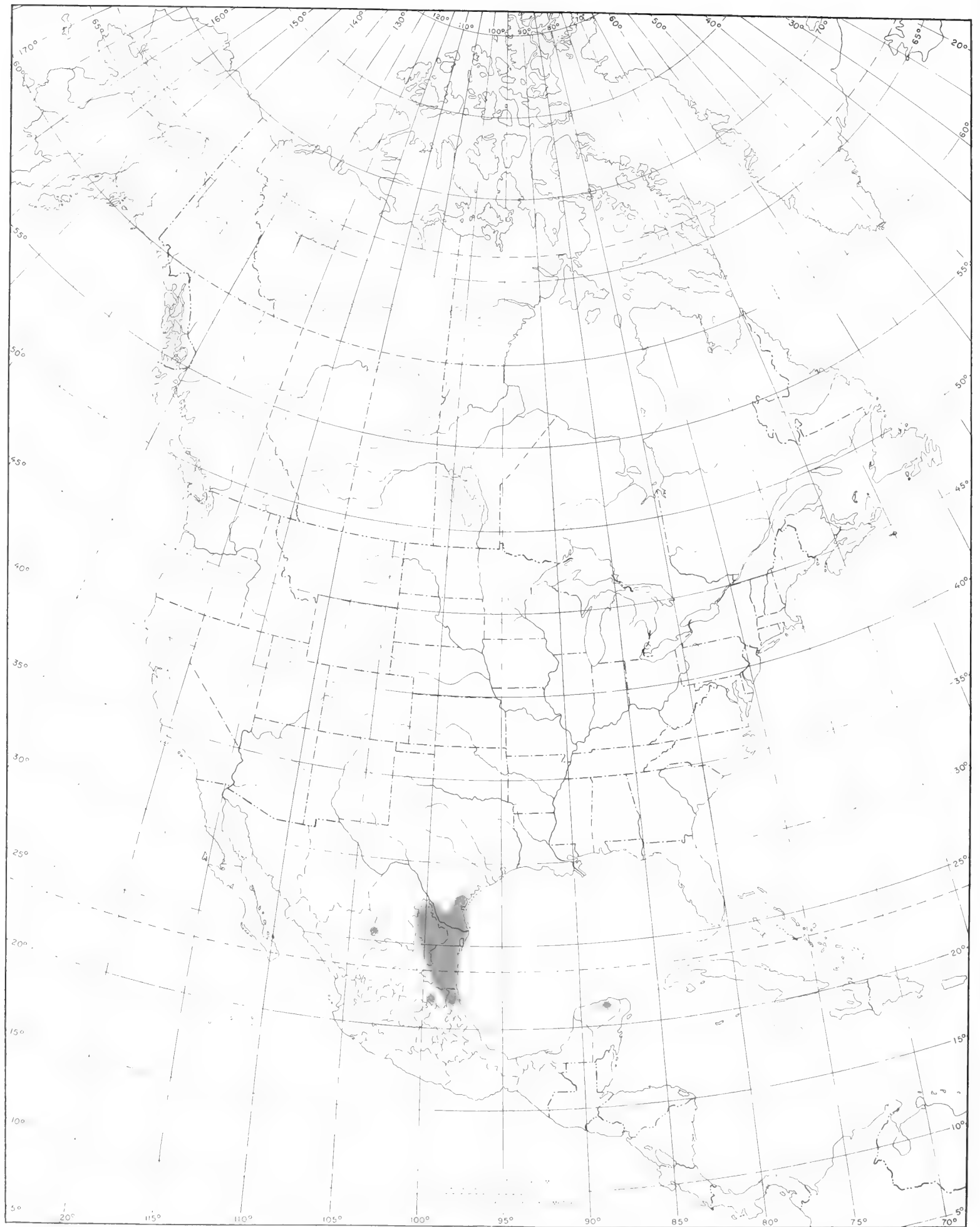
Map 108. *Pistacia texana* Swingle, Texas pistache. Texas and northeastern Mexico only.



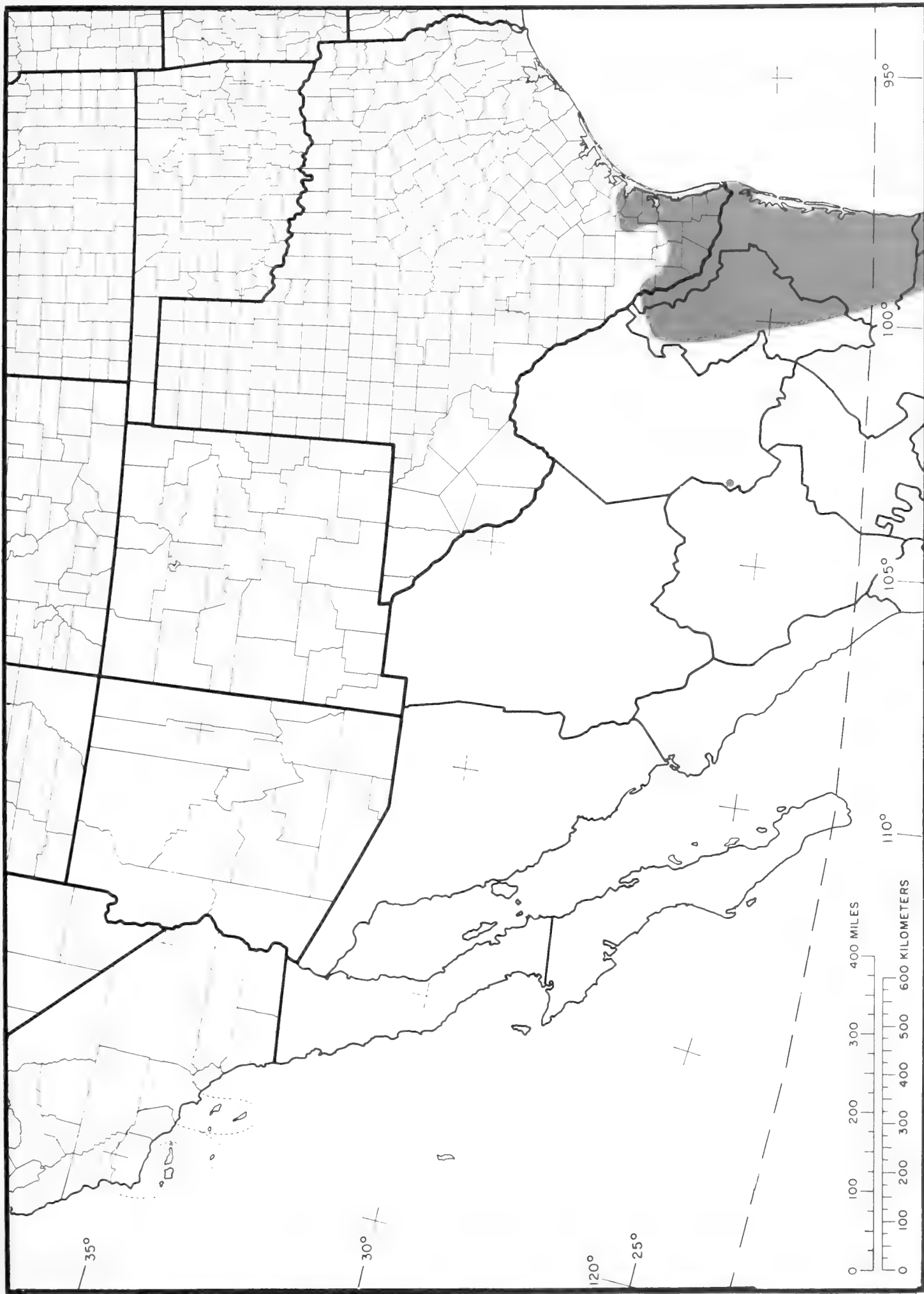
Map 109-NW. *Photinia arbutifolia* Lindl., Christmas-berry, northern range.



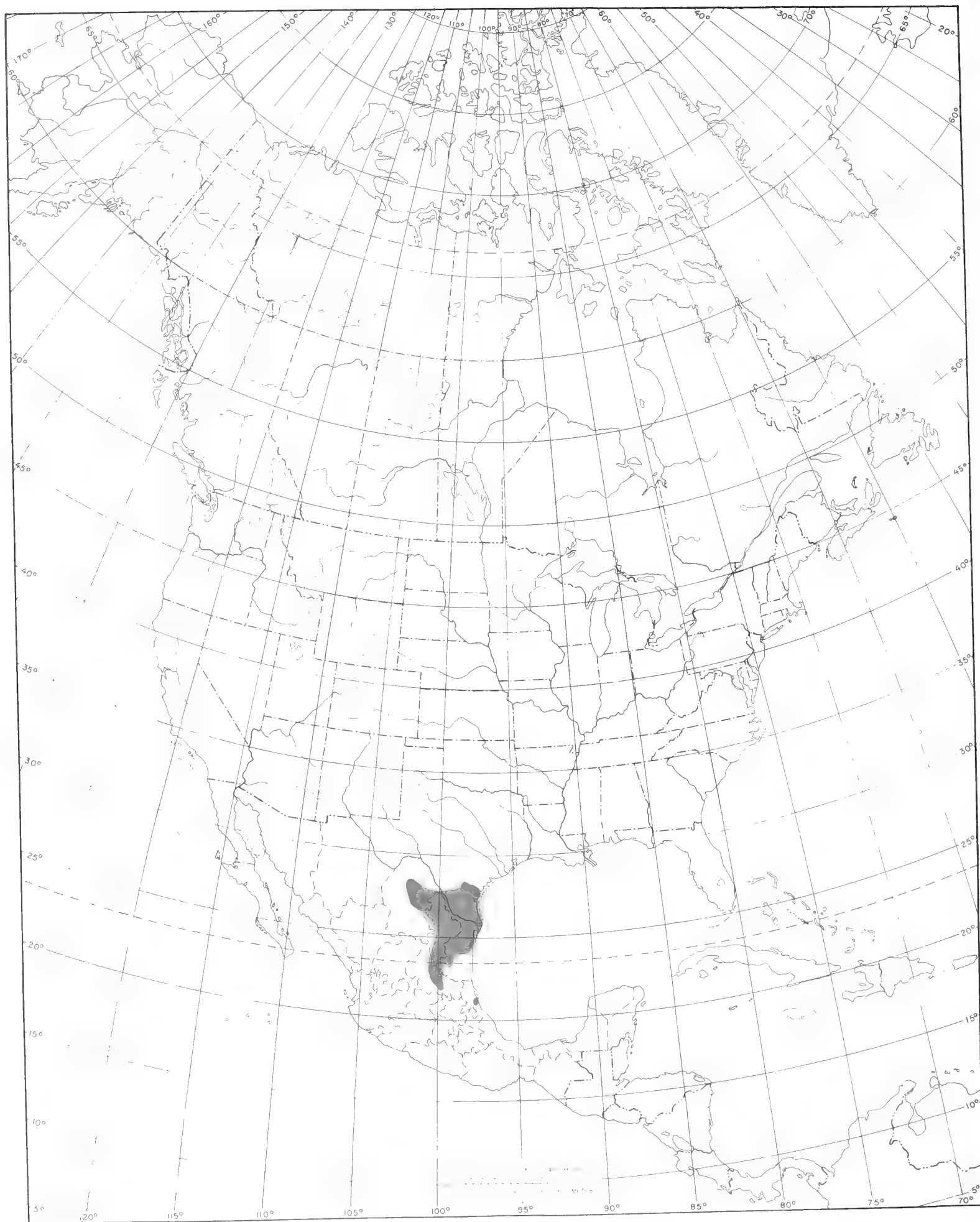
Map 109-SW. *Photinia arbutifolia* Lindl., Christmas-berry, southern range.



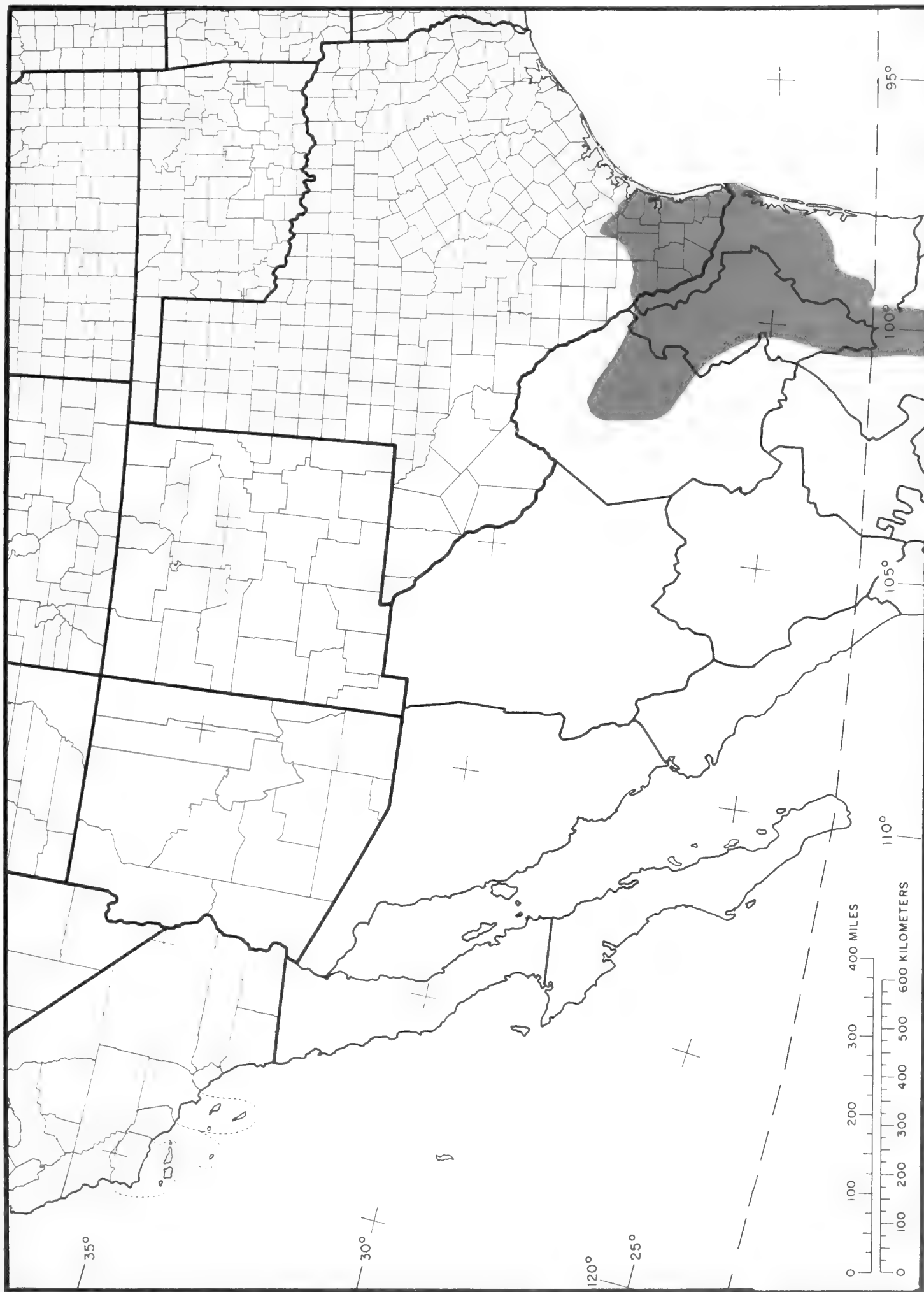
Map 110-N. *Pithecellobium flexicaule* (Benth.) Coult., ebony blackbead.



Map 110-SW. *Pithecellobium flexicaule* (Benth.) Coult., ebony blackhead. Southern Texas and Mexico.



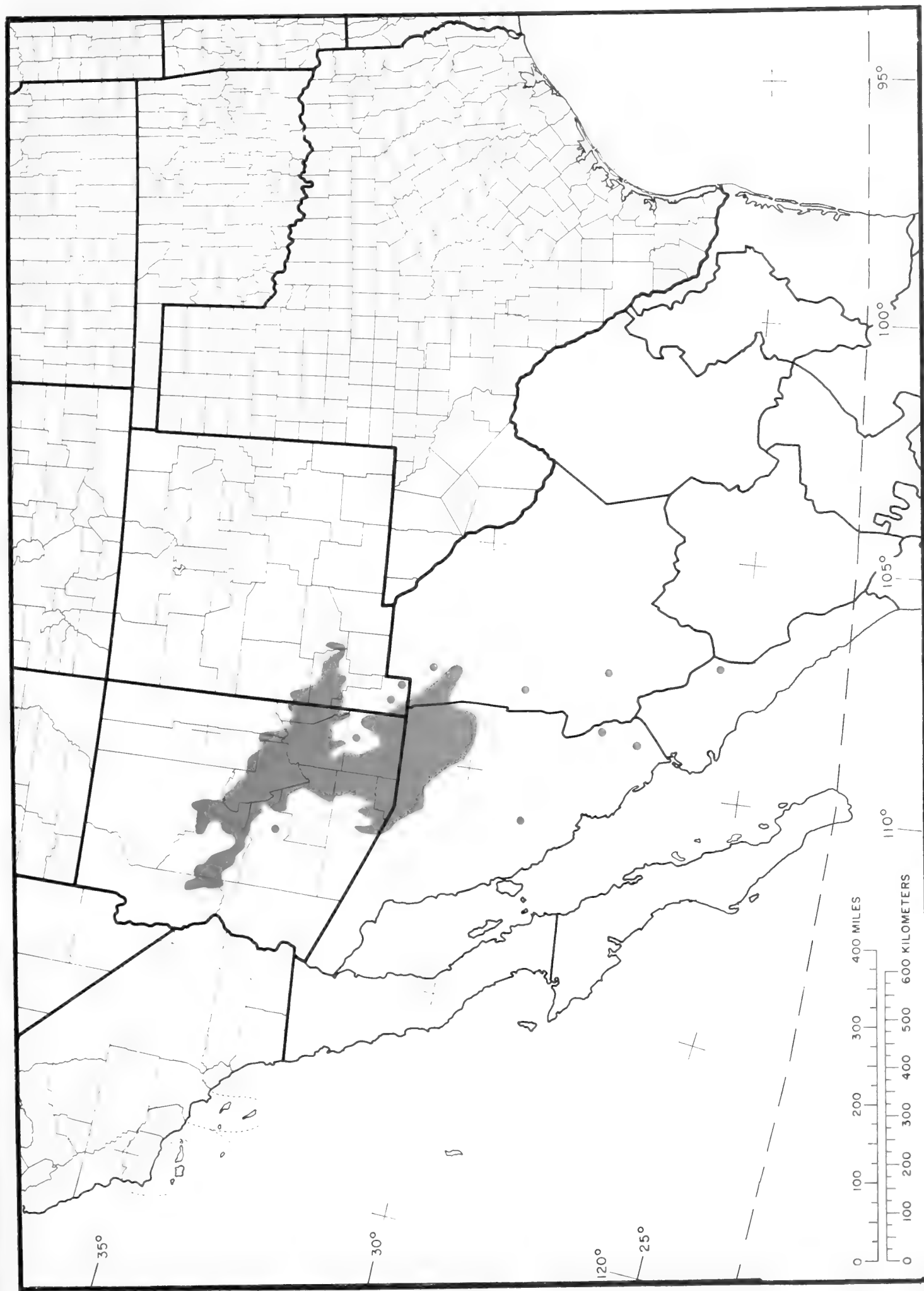
Map 111-N. *Pithecellobium pallens* (Benth.) Standl. huajillo.



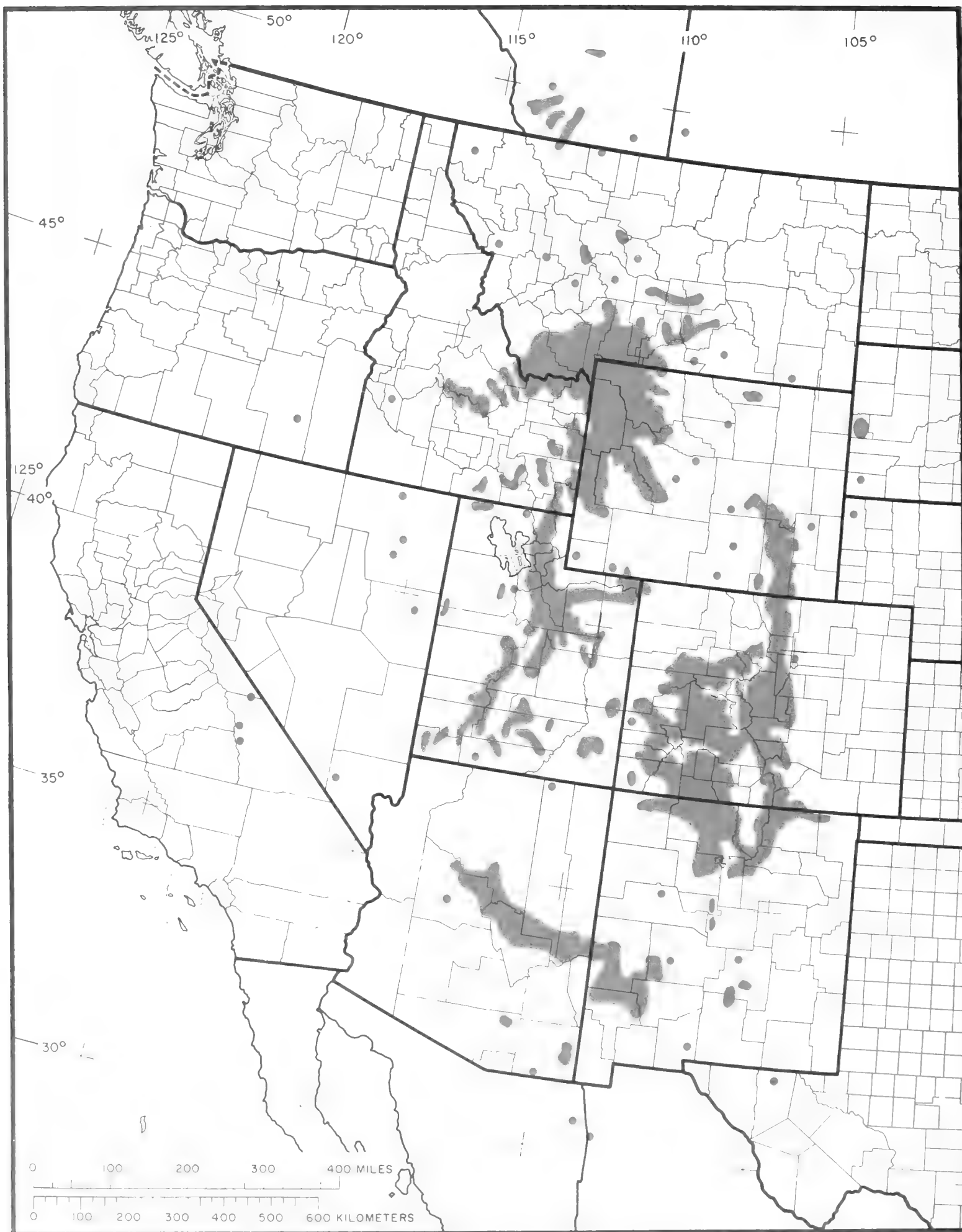
Map 111-SW. *Pithecellobium pallens* (Benth.) Standl., huajillo. Southern Texas and Mexico.



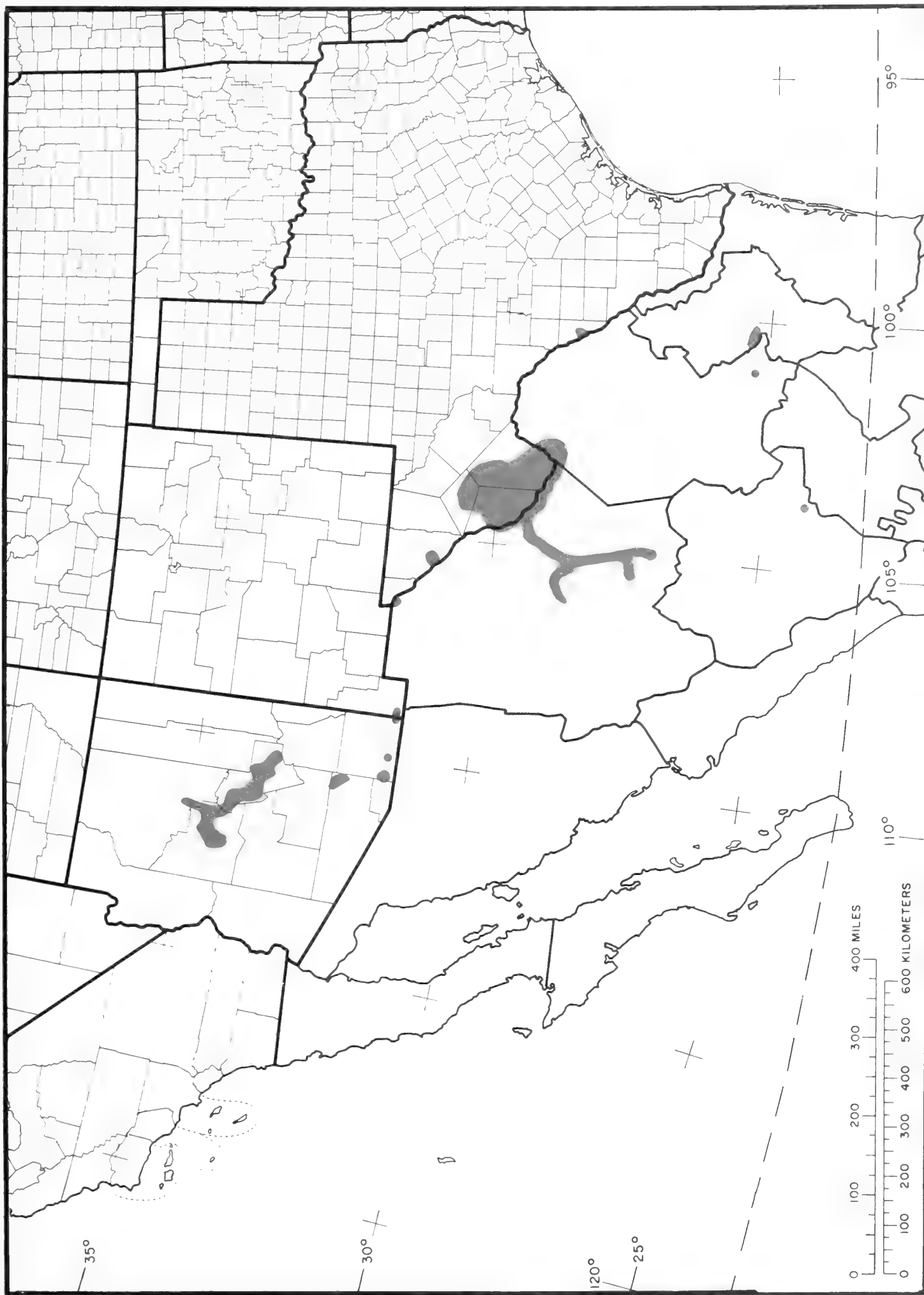
Map 112. *Platanus racemosa* Nutt., California sycamore.



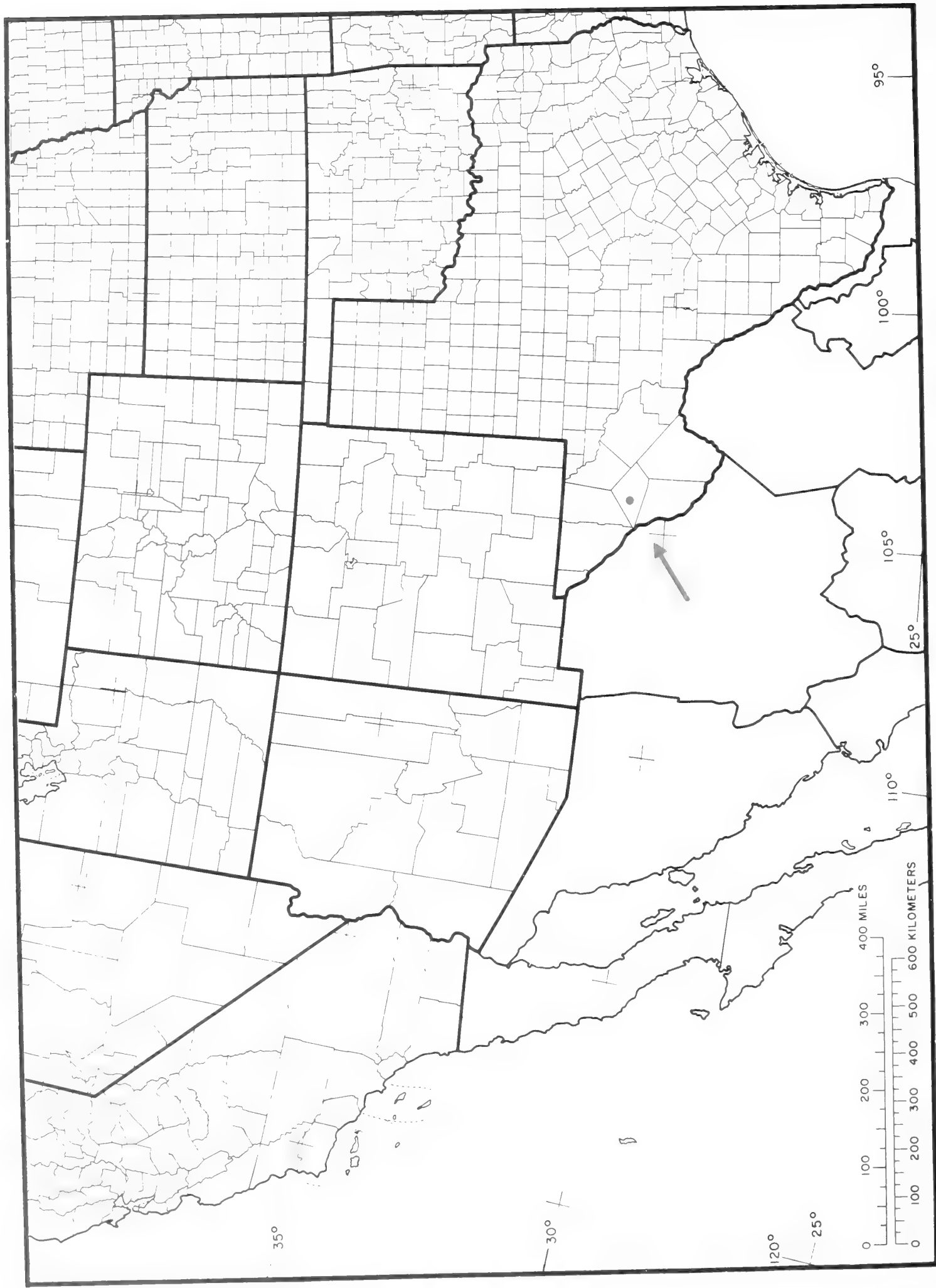
Map 113. *Platanus wrightii* S. Wats., Arizona sycamore. Arizona, southwestern New Mexico, and northwestern Mexico.



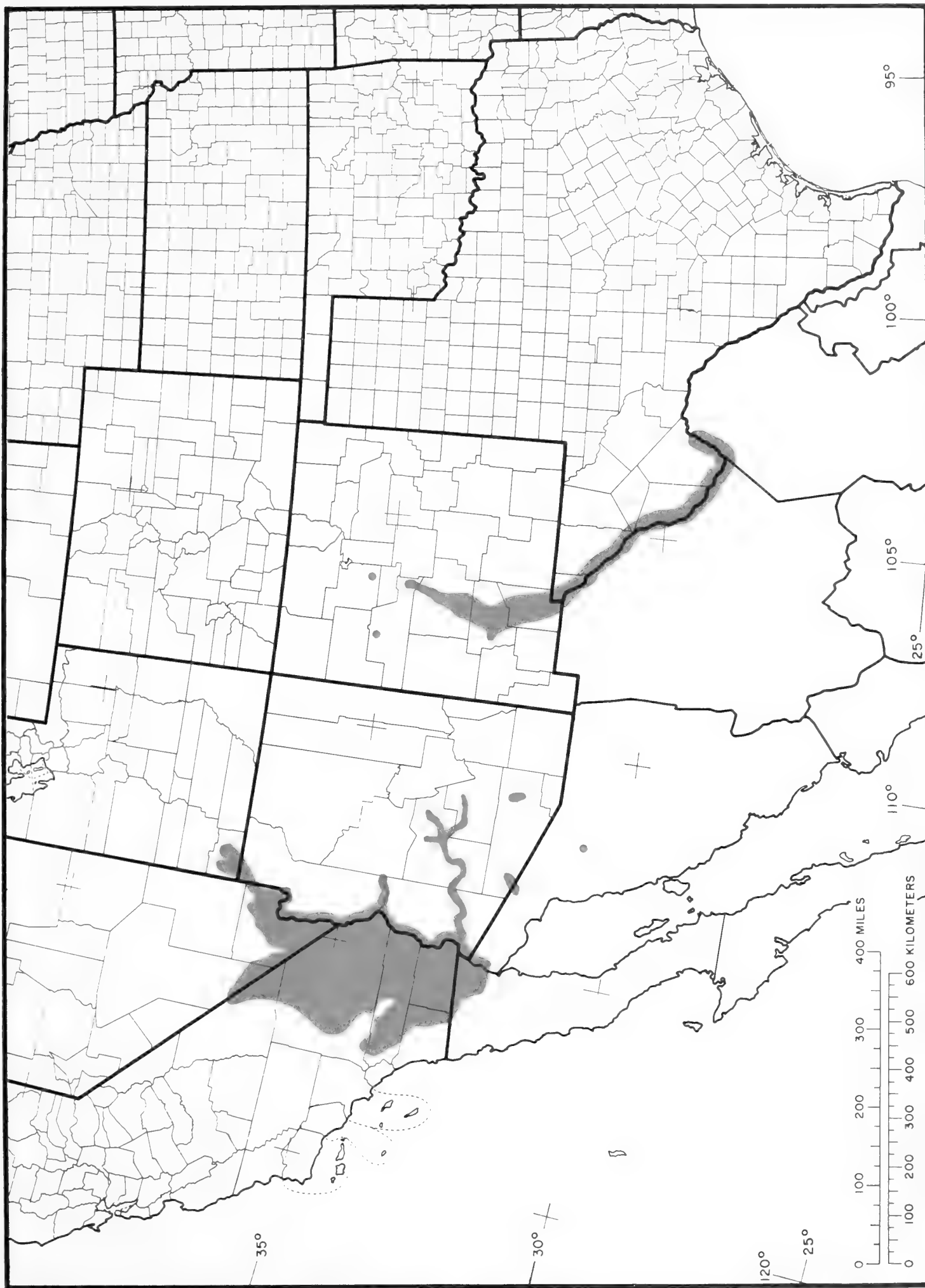
Map 114. *Populus angustifolia* James. narrowleaf cottonwood.



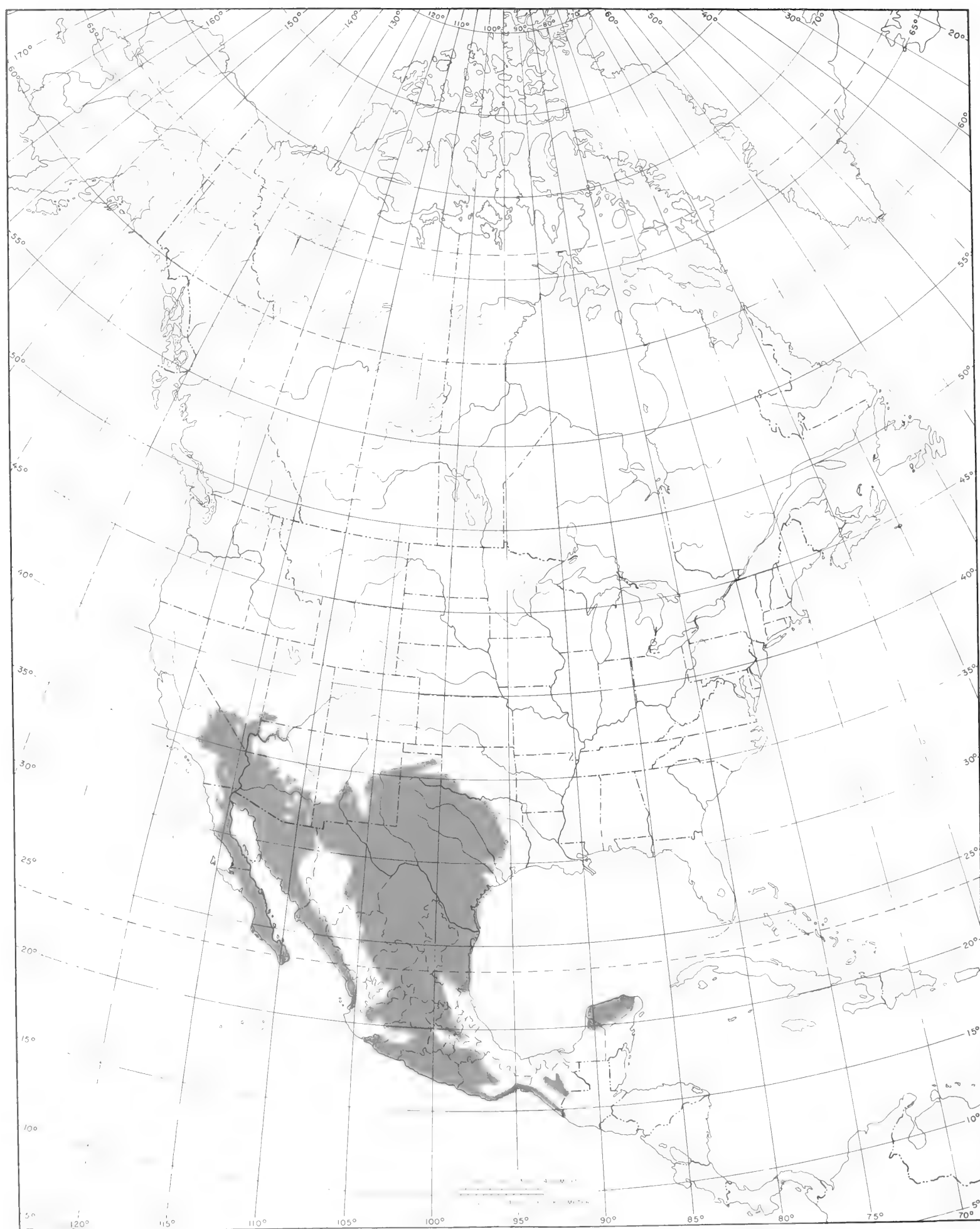
Map. 115. *Populus arizonica* Sarg., Arizona cottonwood.



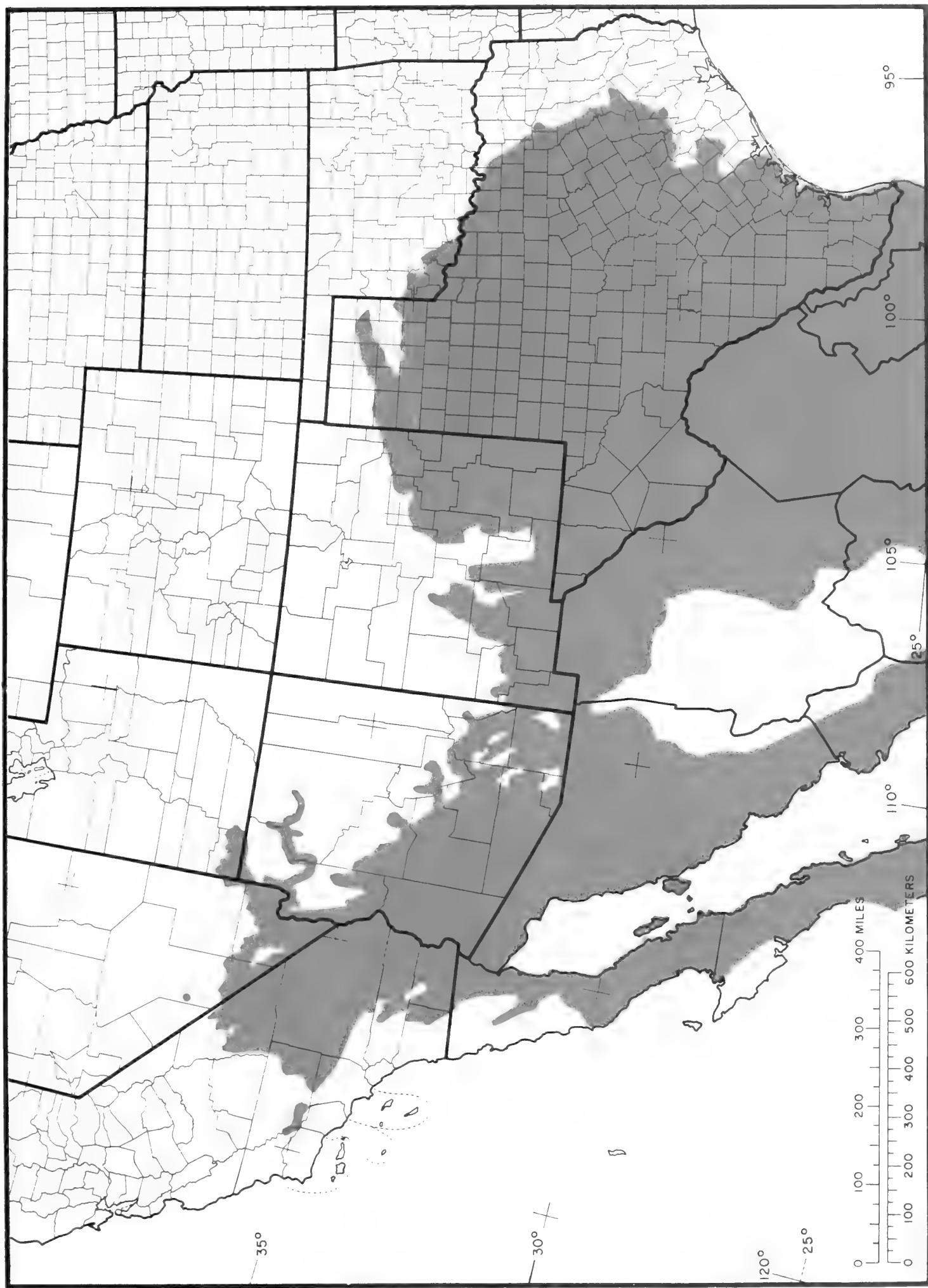
Map 116. *Populus hinckleyana* Correll, Hinckley cottonwood. Davis Mountains and vicinity, Texas, only.



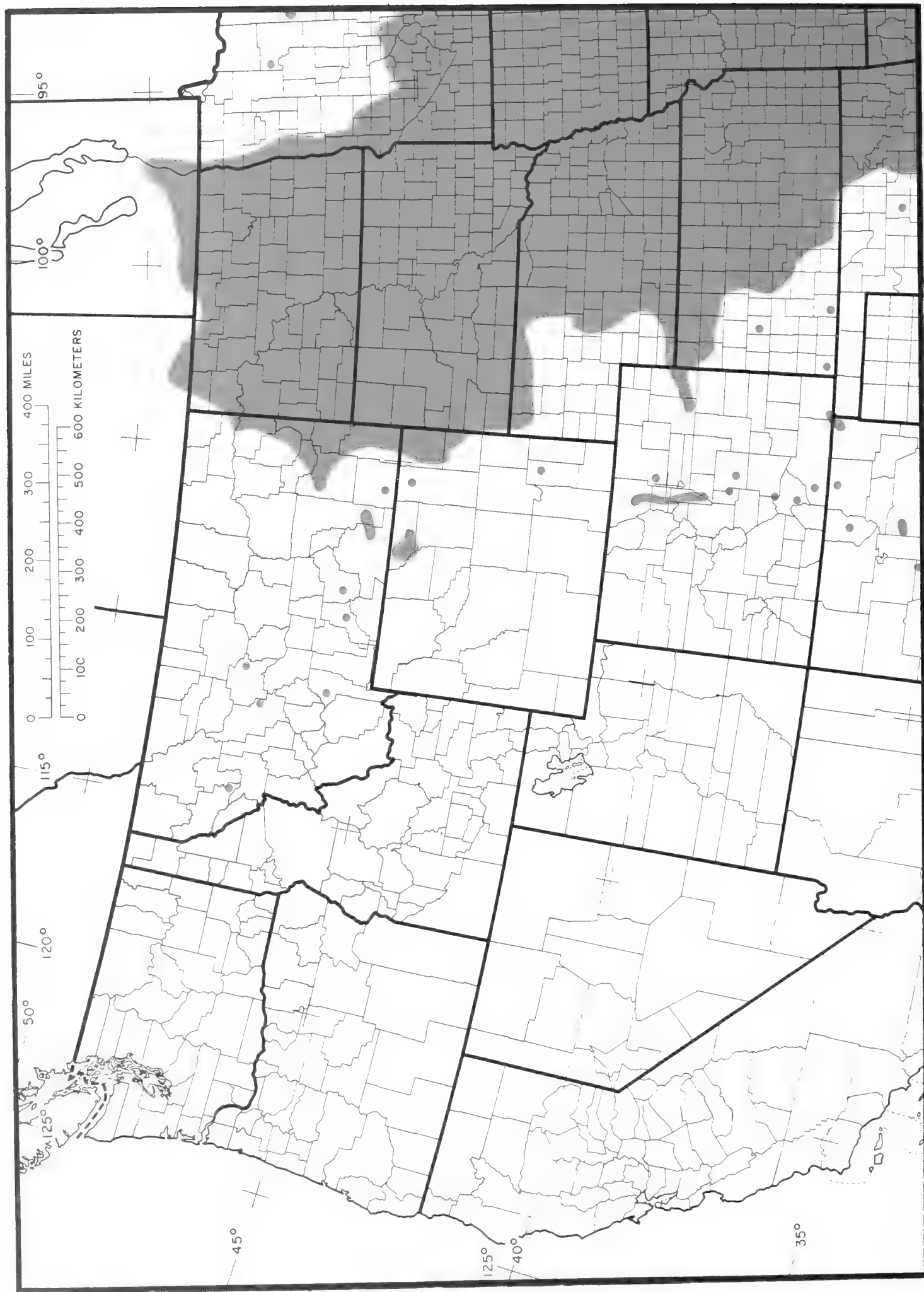
Map 117. *Prosopis pubescens* Benth., screwbean mesquite.



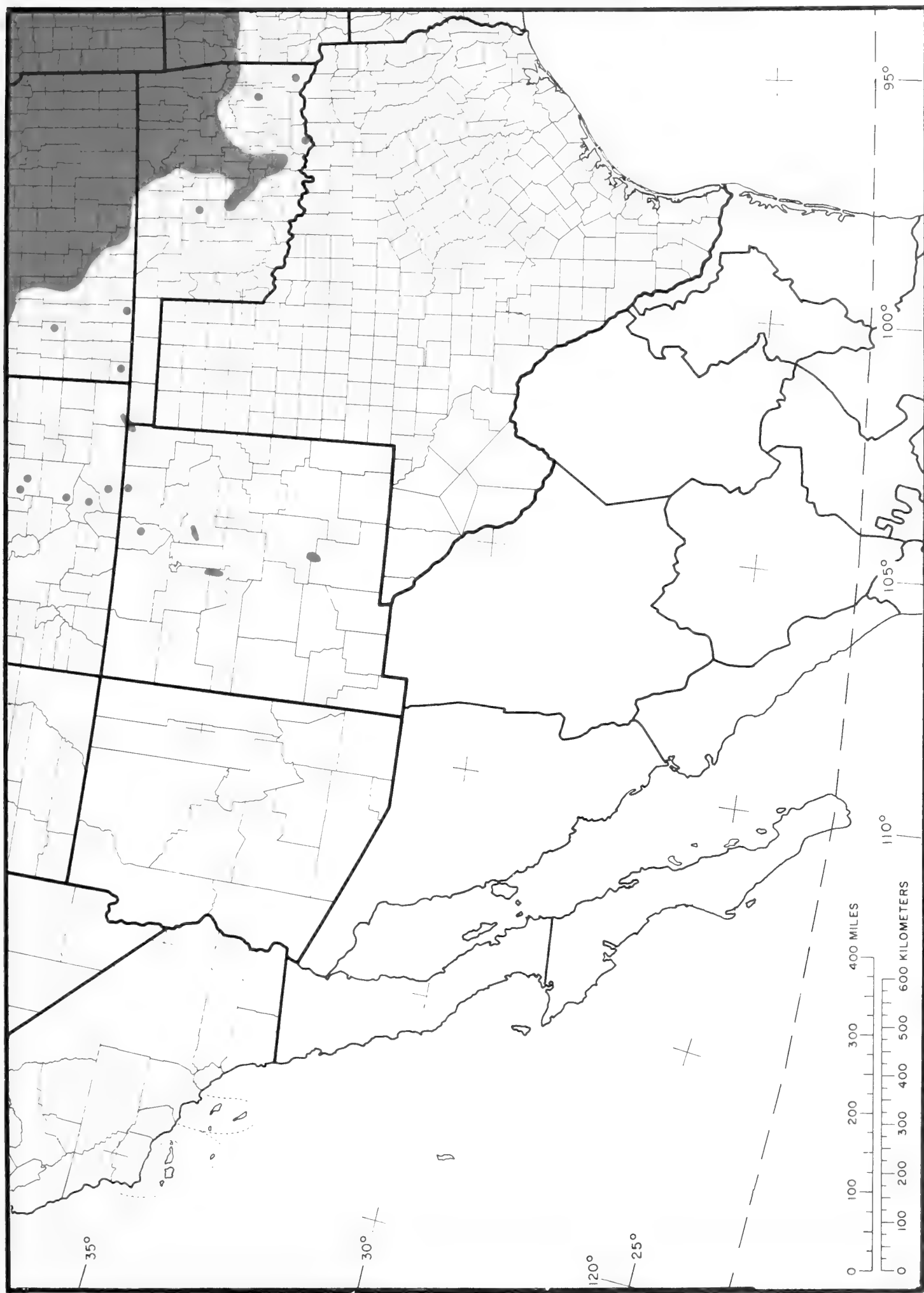
Map 118-N. *Prosopis juliflora* (Sw.) DC., mesquite. Widely distributed in tropical America (not mapped), also introduced and naturalized northward and southward, in West Indies, and in Old World tropics.



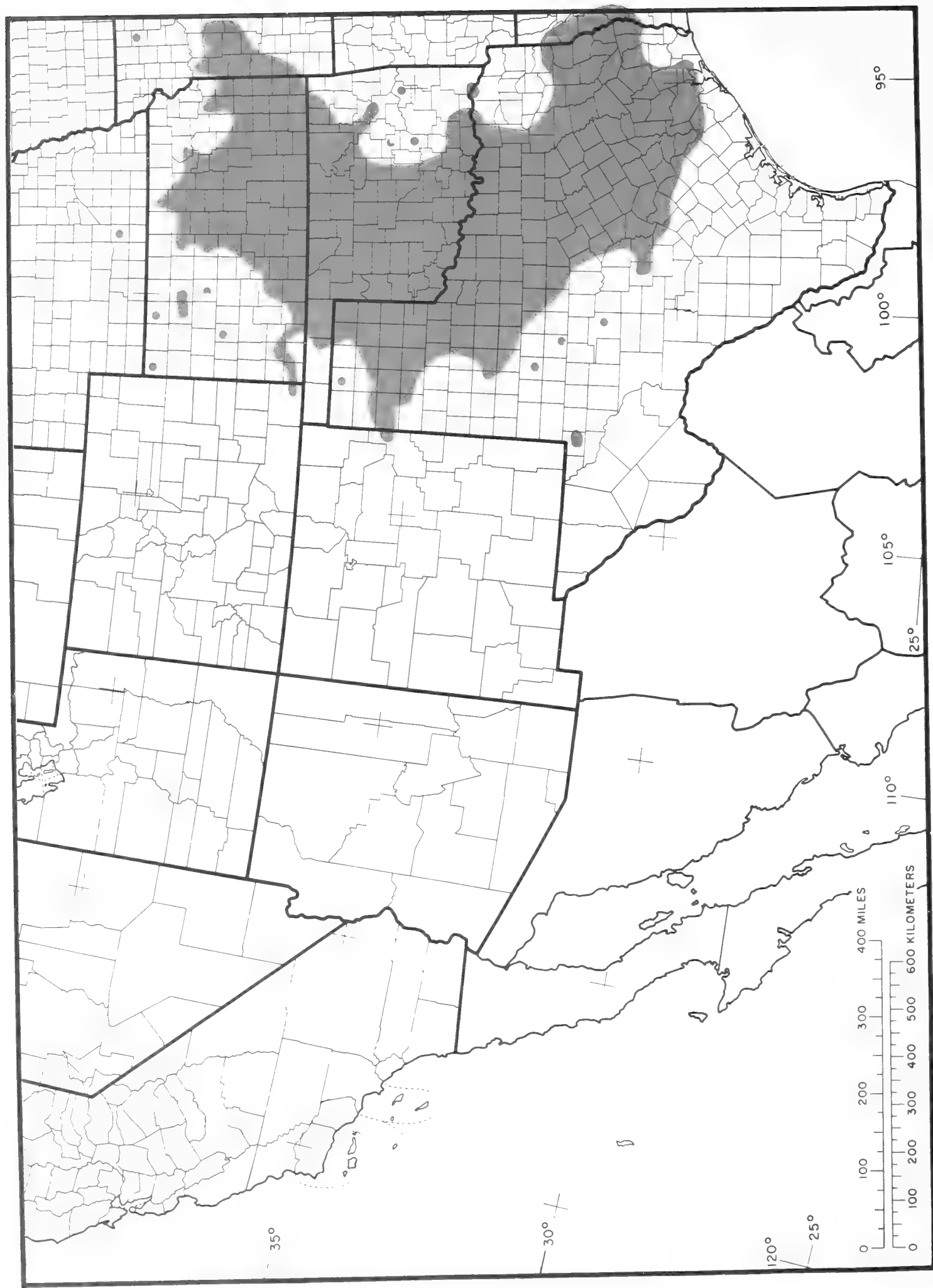
Map 118-SW. *Prosopis juliflora* (Sw.) DC., mesquite. Also naturalized northward.



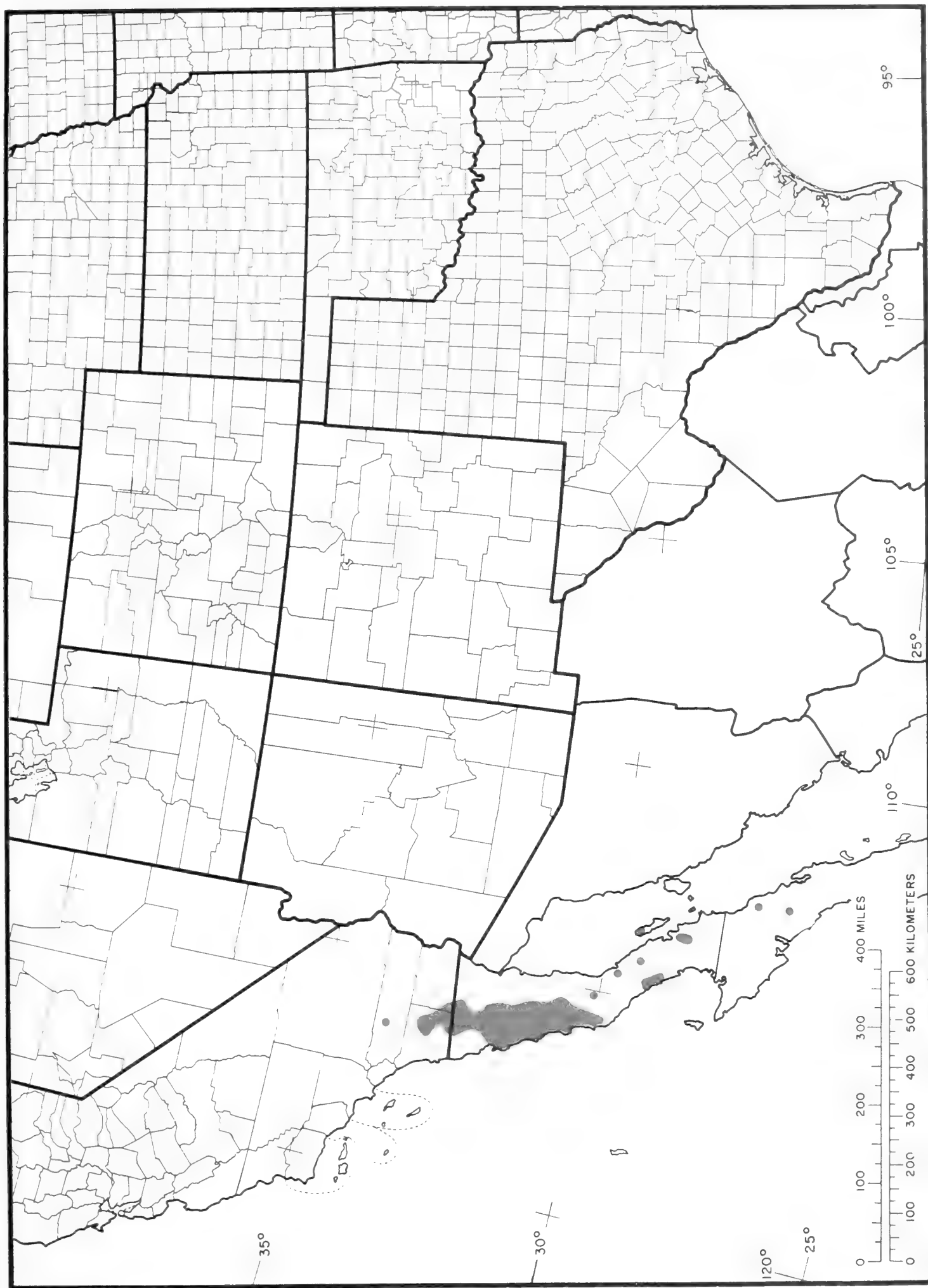
Map 119.NW. *Prunus americana* Marsh., American plum, northwestern range. Eastern range in Volume 4.



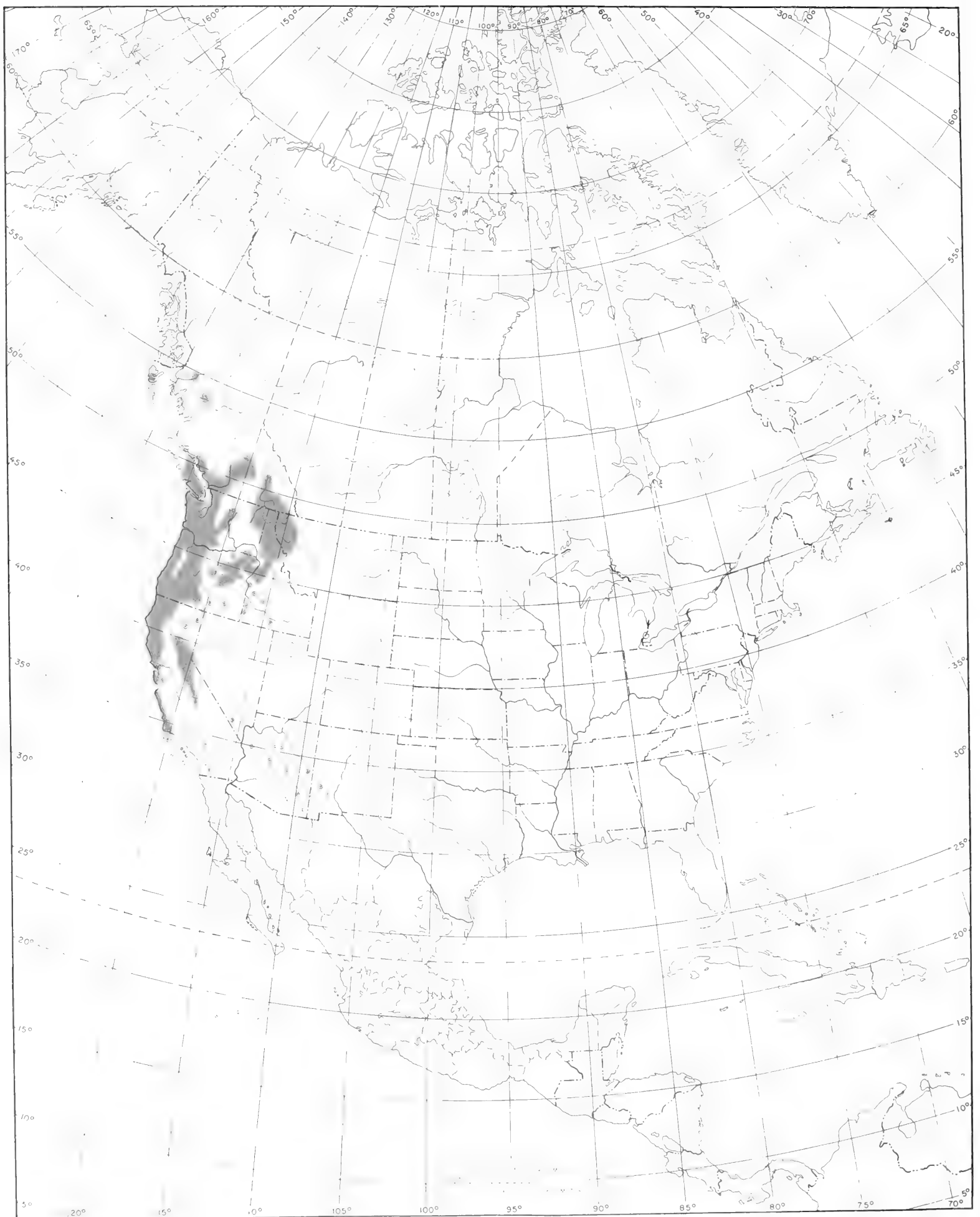
Map 119-SW. *Prunus americana* Marsh., American plum, southwestern range. Eastern range in Volume 4.



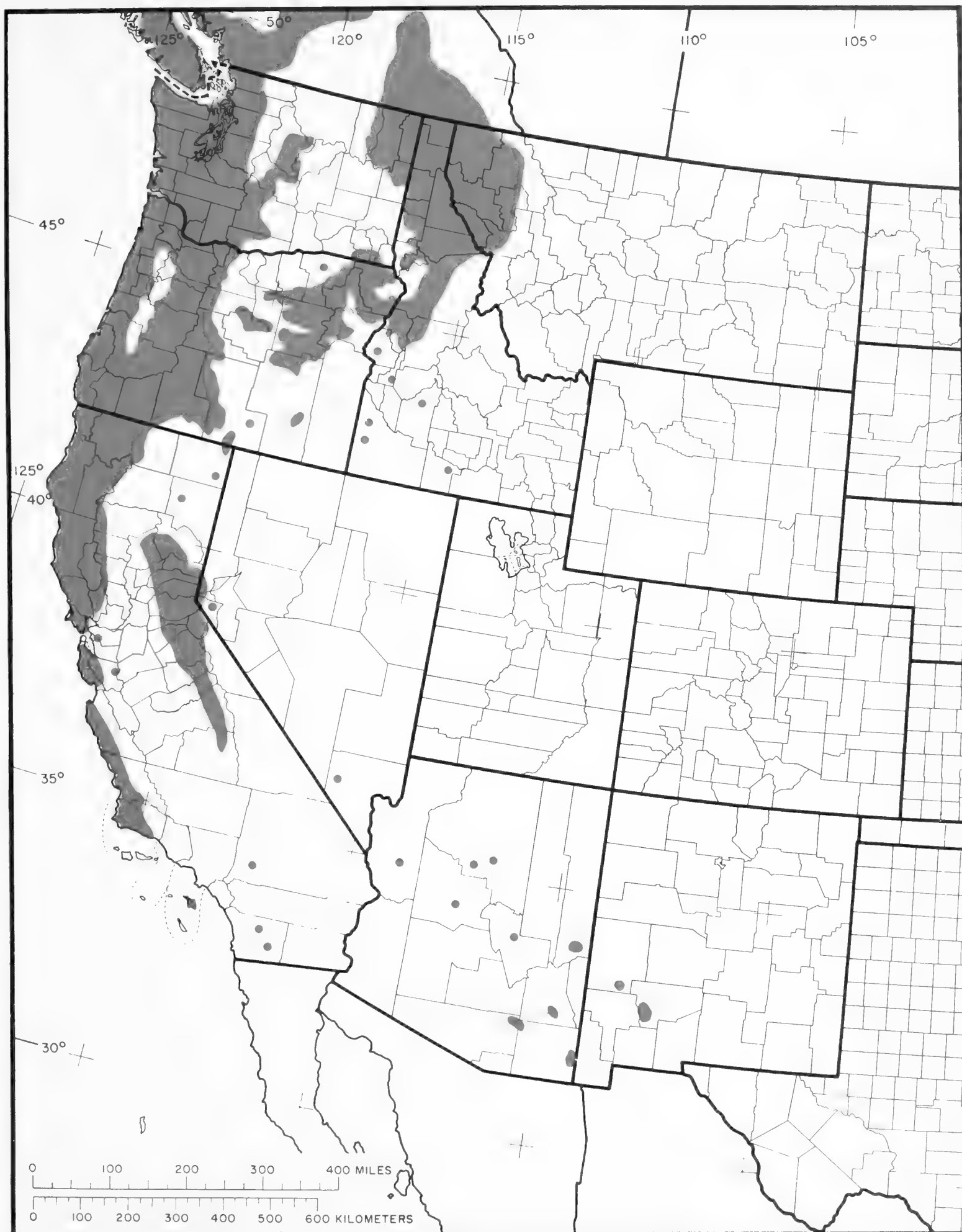
Map 120. *Prunus angustifolia* Marsh., Chickasaw plum. Also naturalized eastward.



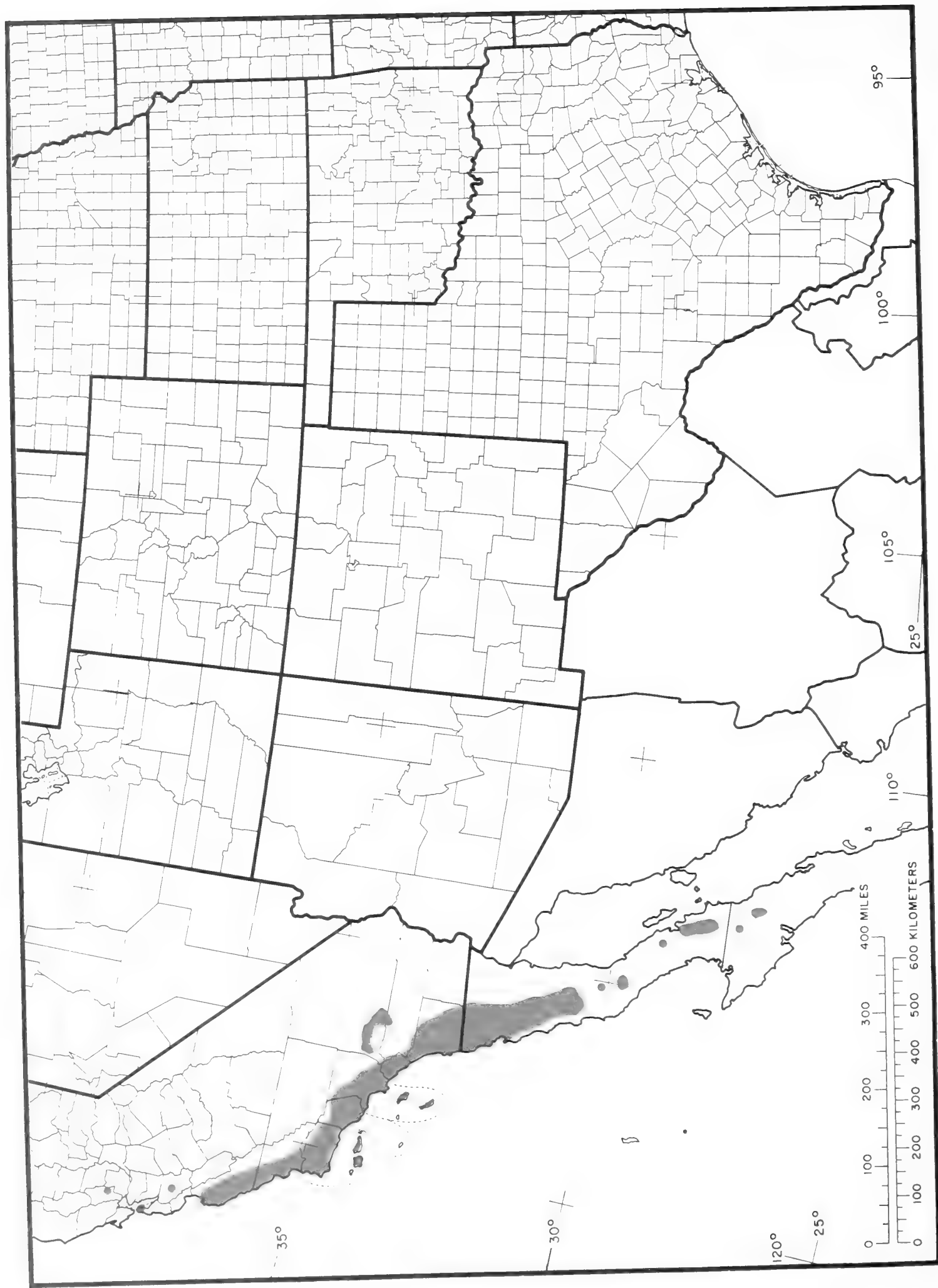
Map 121. *Prunus fremontii* S. Wats., desert apricot. Southern California and Baja California only.



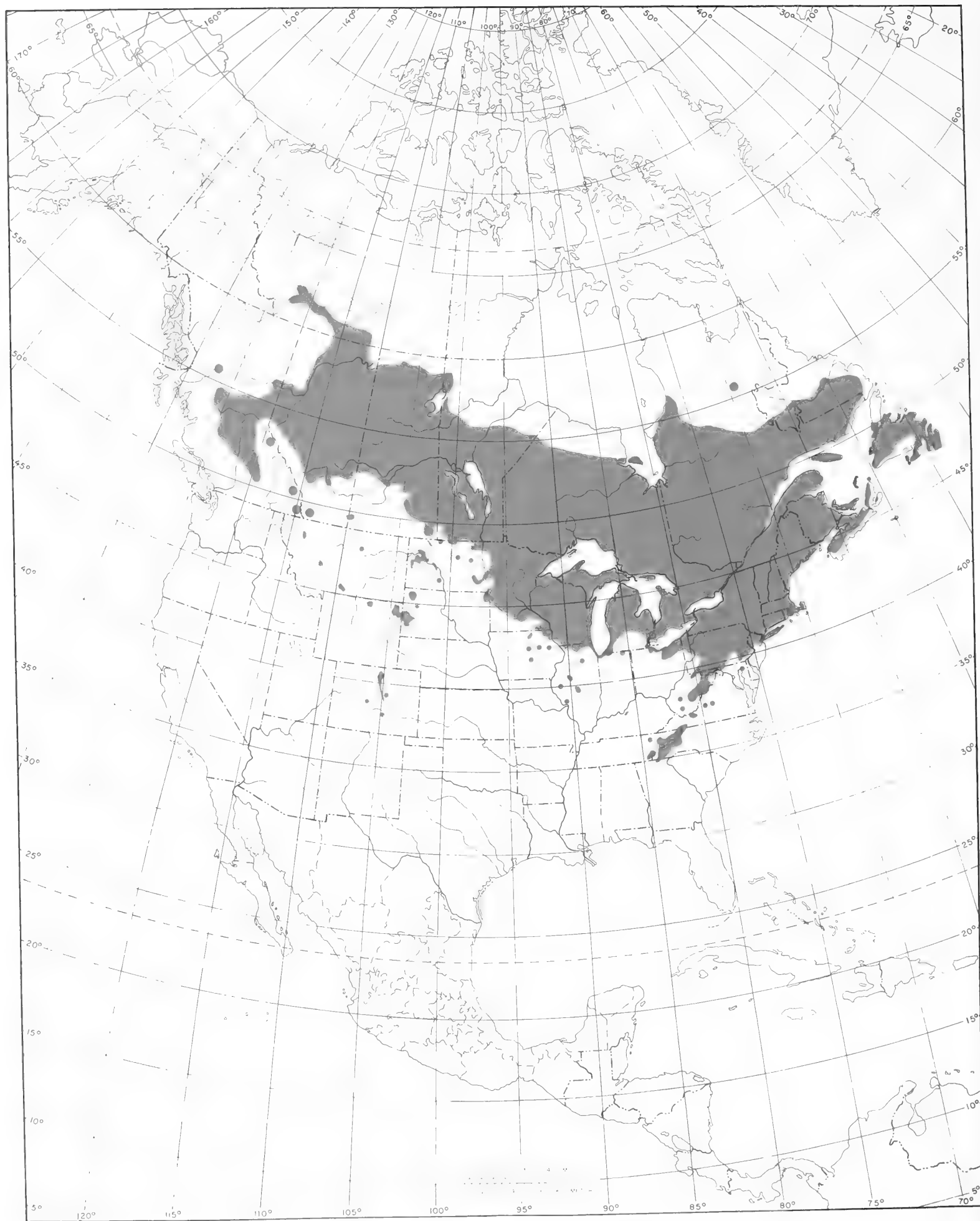
Map 122-N. *Prunus emarginata* Dougl.. bitter cherry.



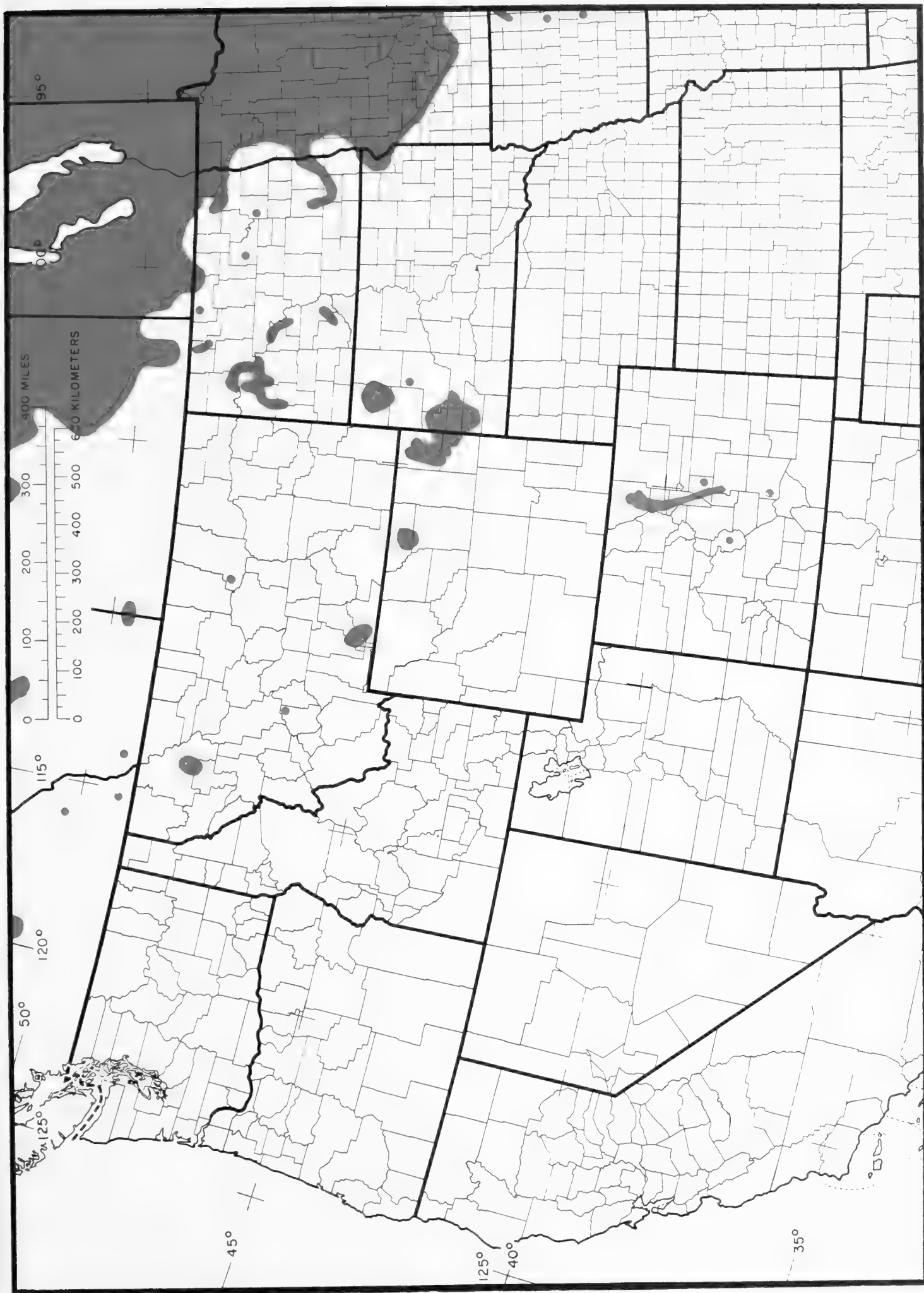
Map 122-W. *Prunus emarginata* Dougl., bitter cherry.



Map 123. *Prunus ilicifolia* (Nutt.) D. Dietr., hollyleaf cherry.



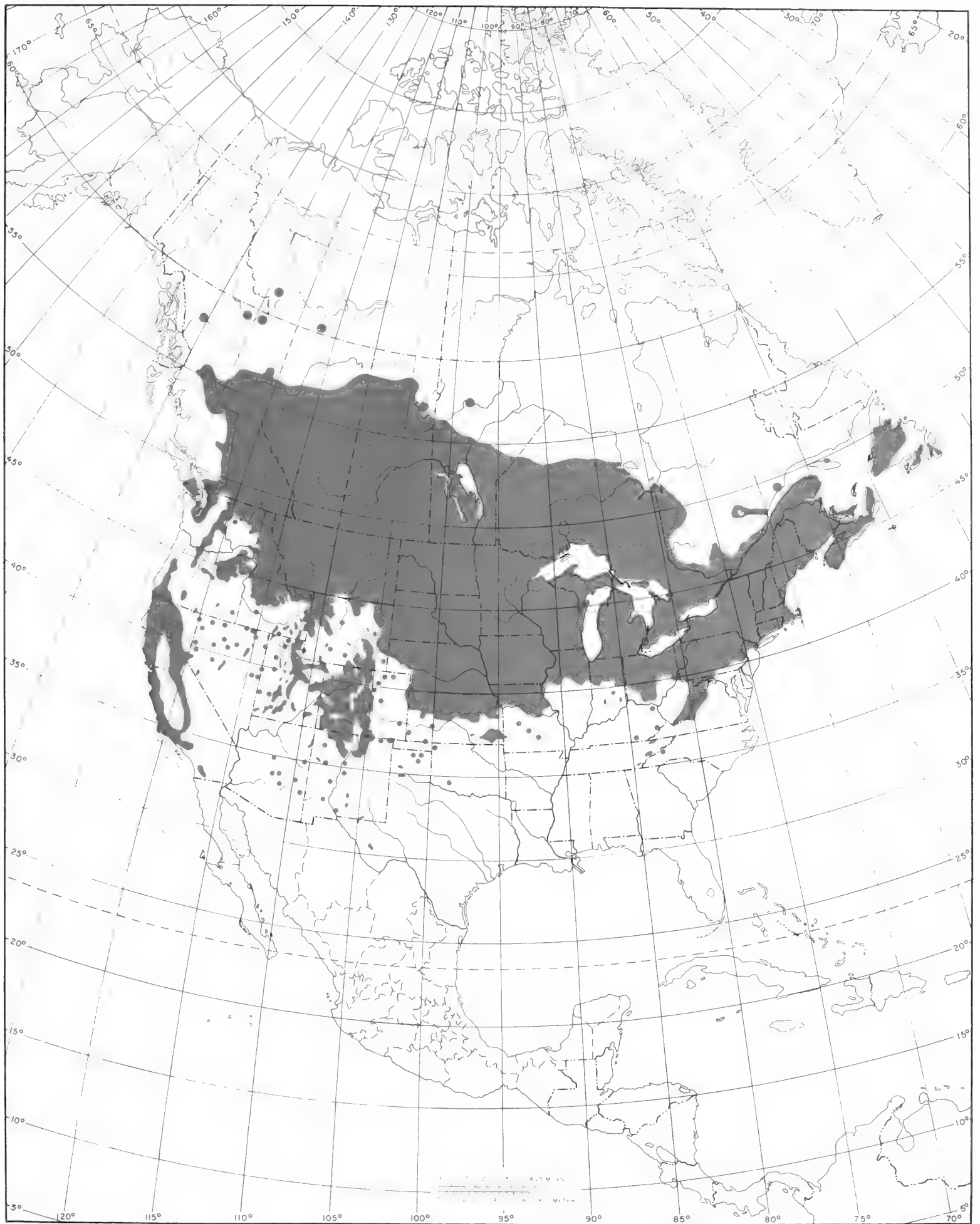
Map 125-N. *Prunus pensylvanica* L. f., pin cherry.



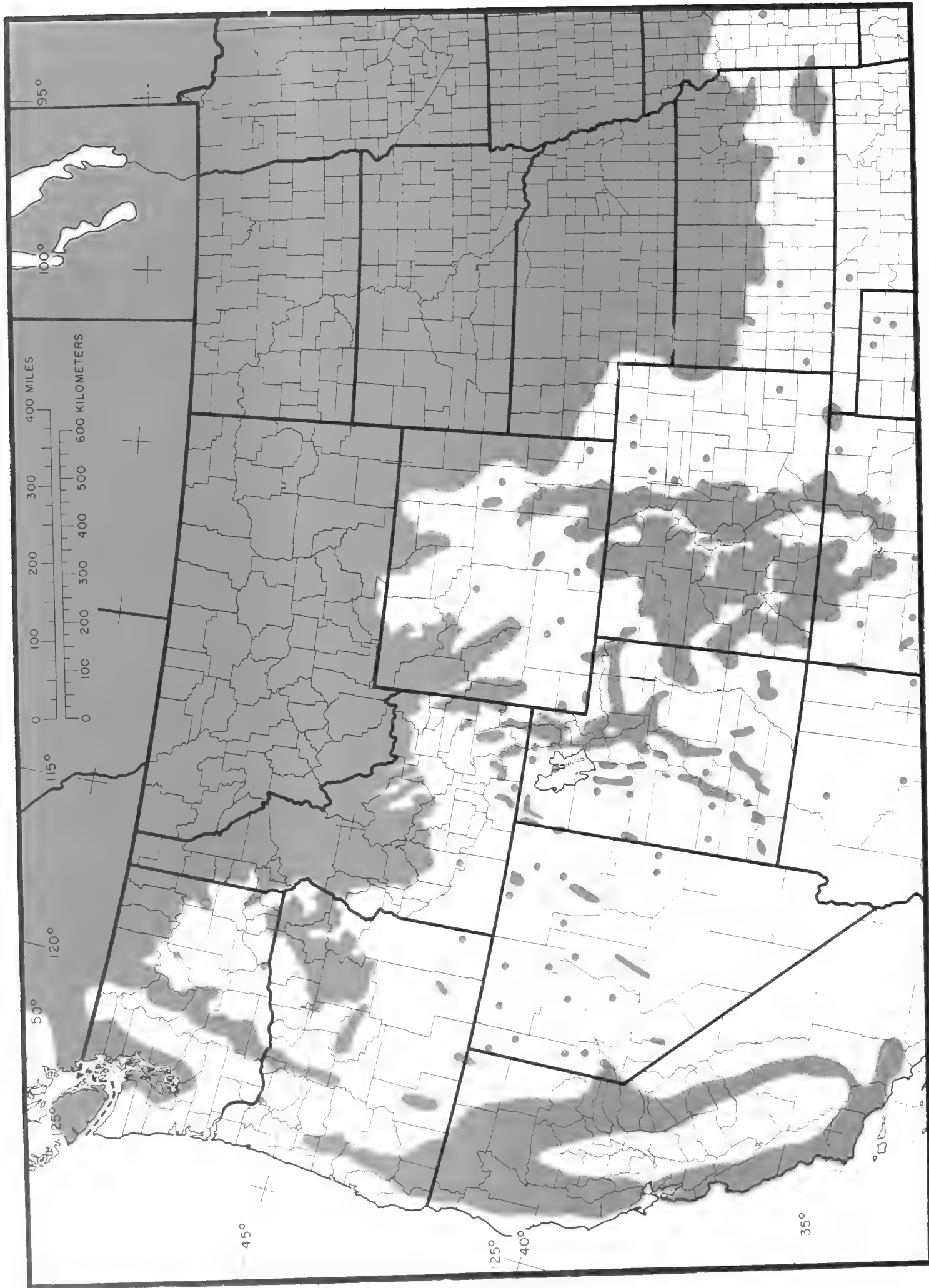
Map 125-NW. *Prunus pensylvanica* L. f., pin cherry, western range. Eastern range in Volume 4.



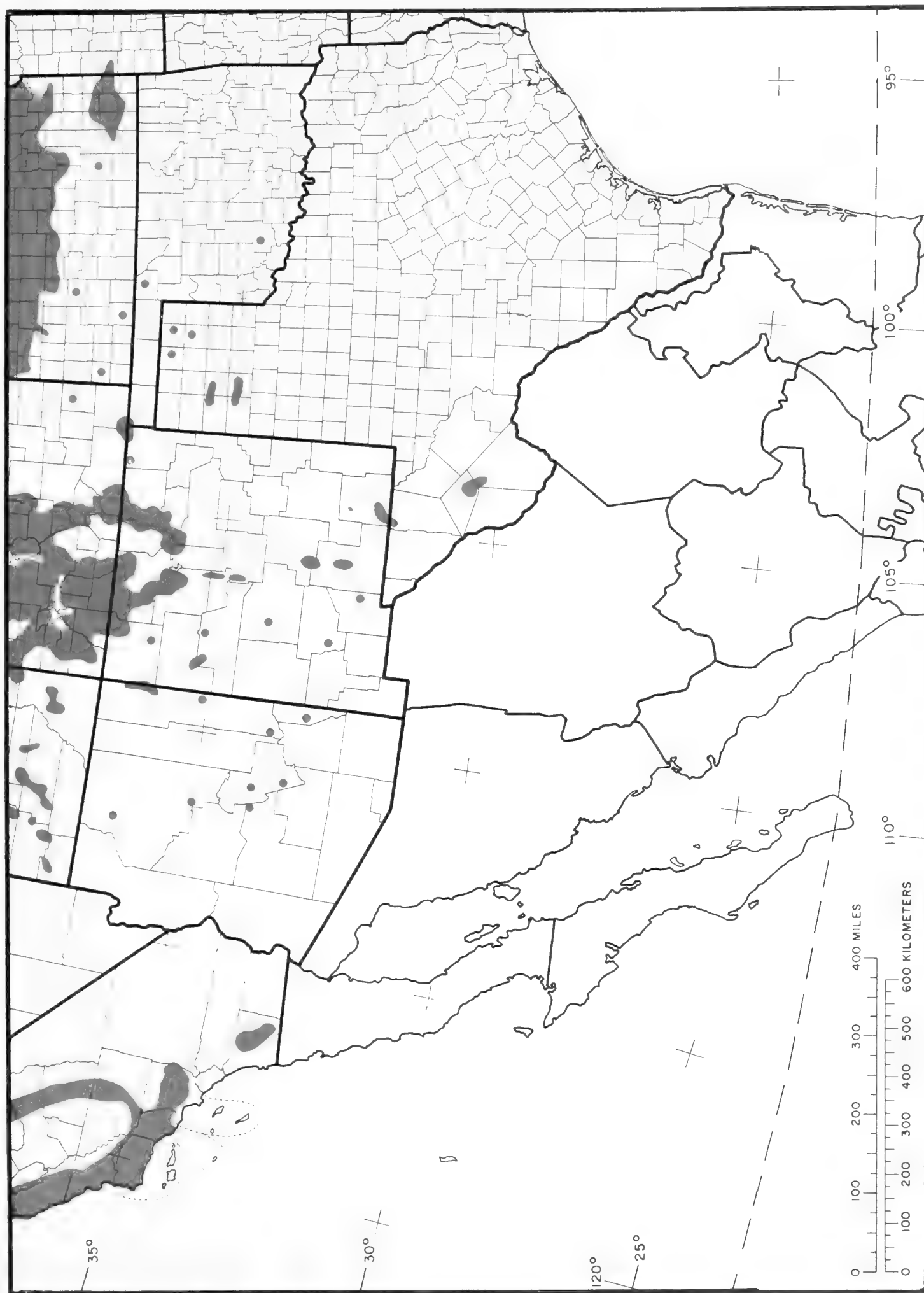
Map 126. *Prunus subcordata* Benth., Klamath plum.



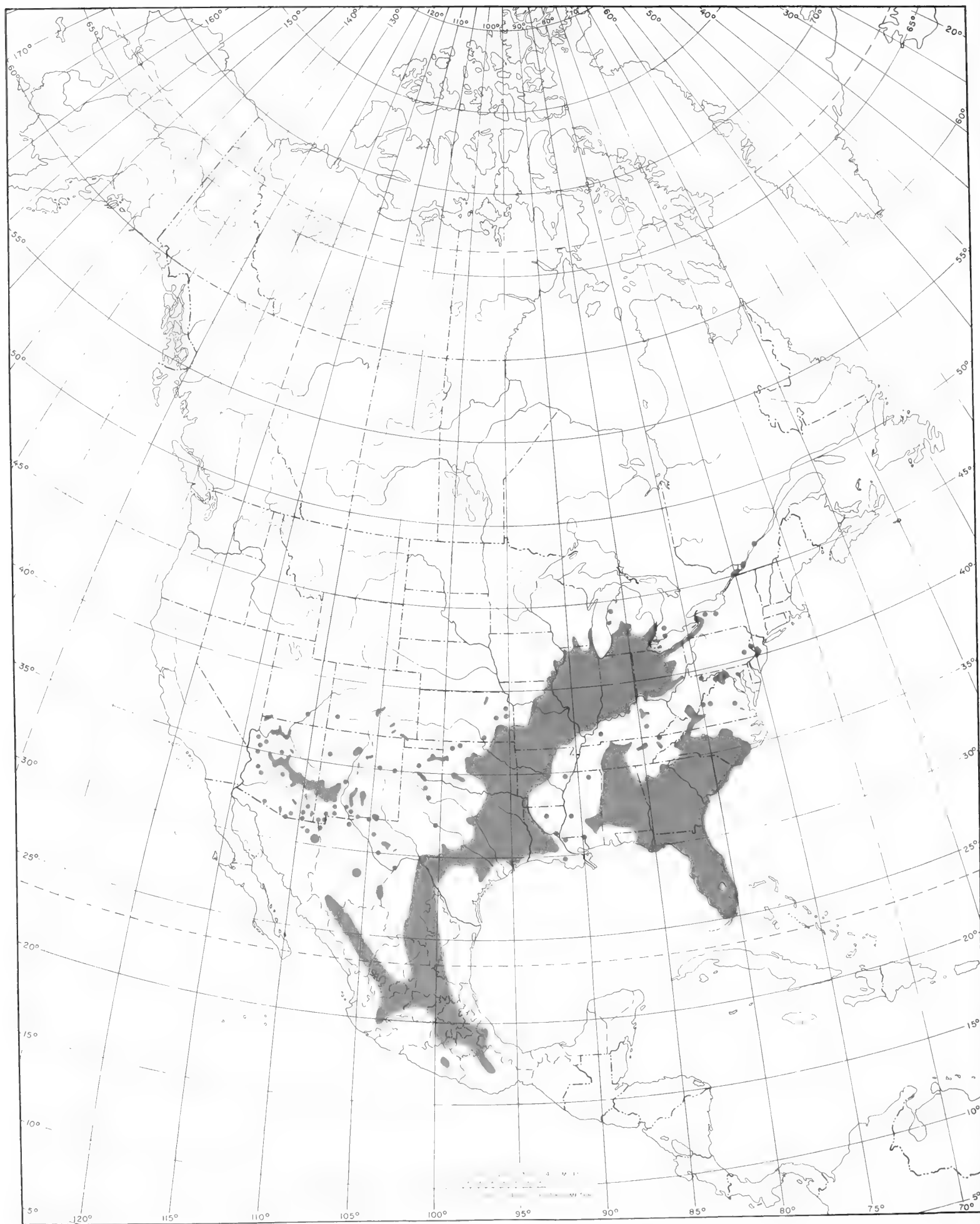
Map 127-N. *Prunus virginiana* L., common chokecherry.



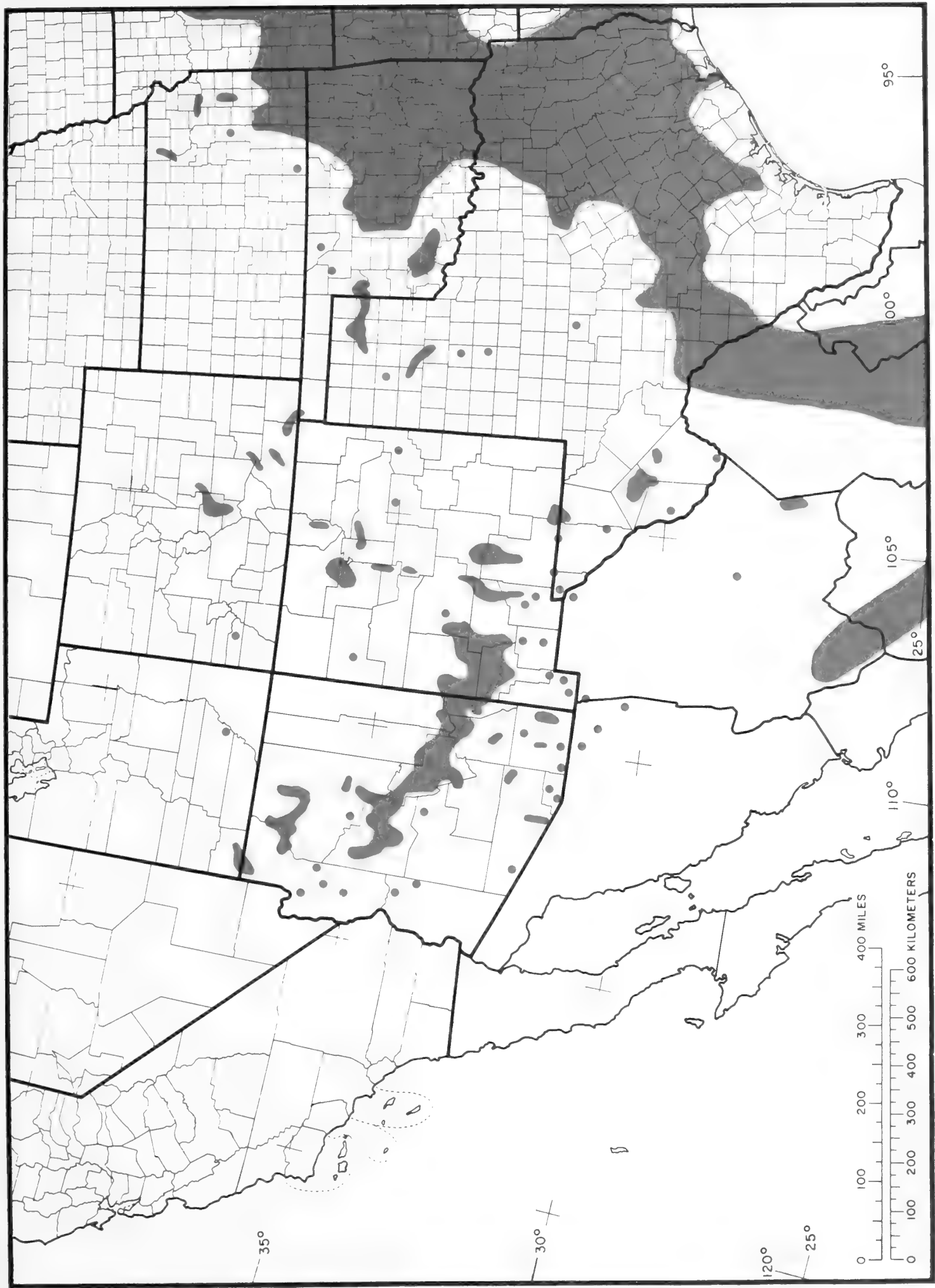
Map 127-NW. *Prunus virginiana* L., common chokecherry, northwestern range. Eastern range in Volume 4.



Map 127-SW. *Prunus virginiana* L., common chokecherry, southwestern range. Eastern range in Volume 4.



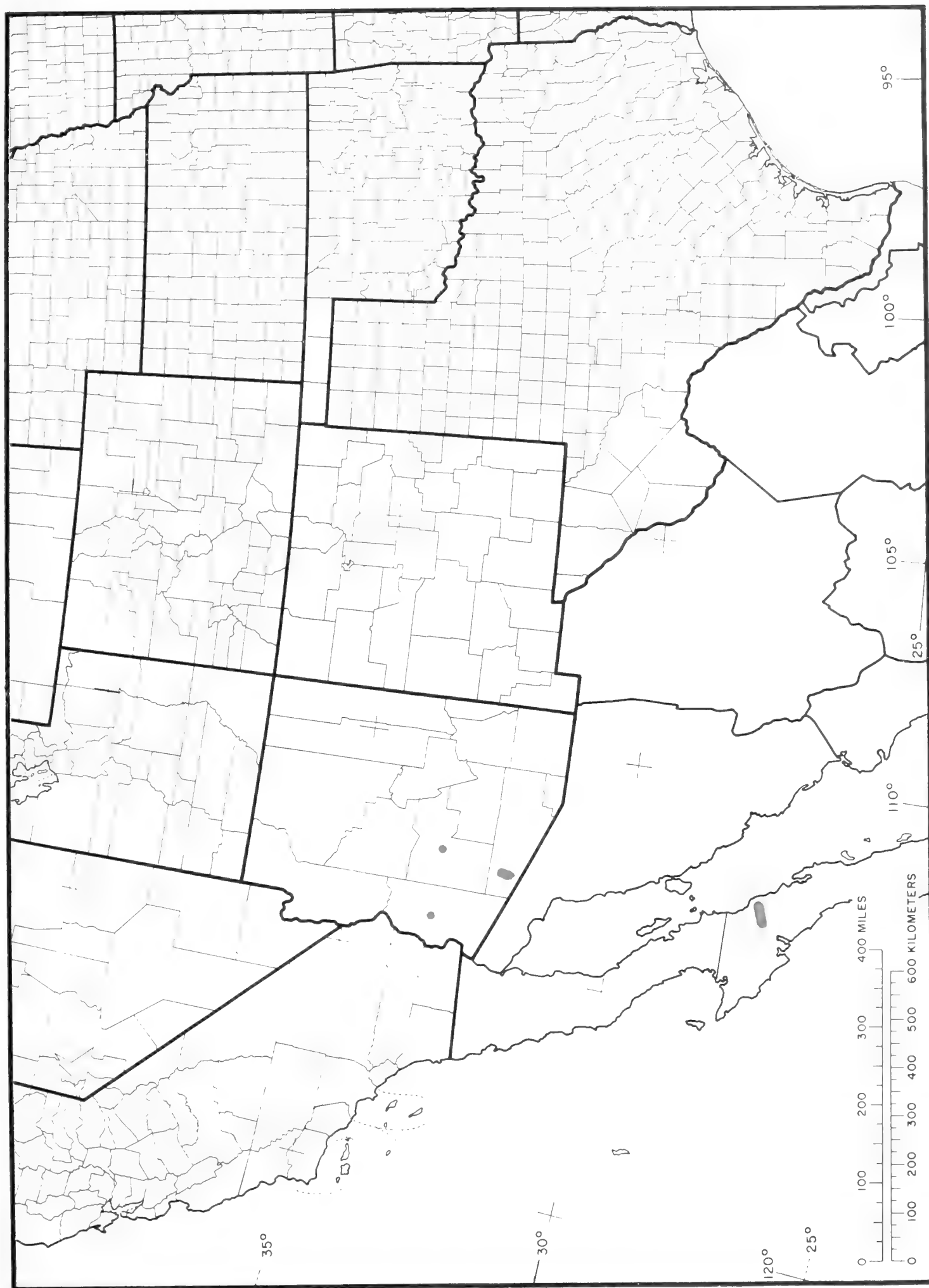
Map 128-N. *Ptelea trifoliata* L., common hoptree.



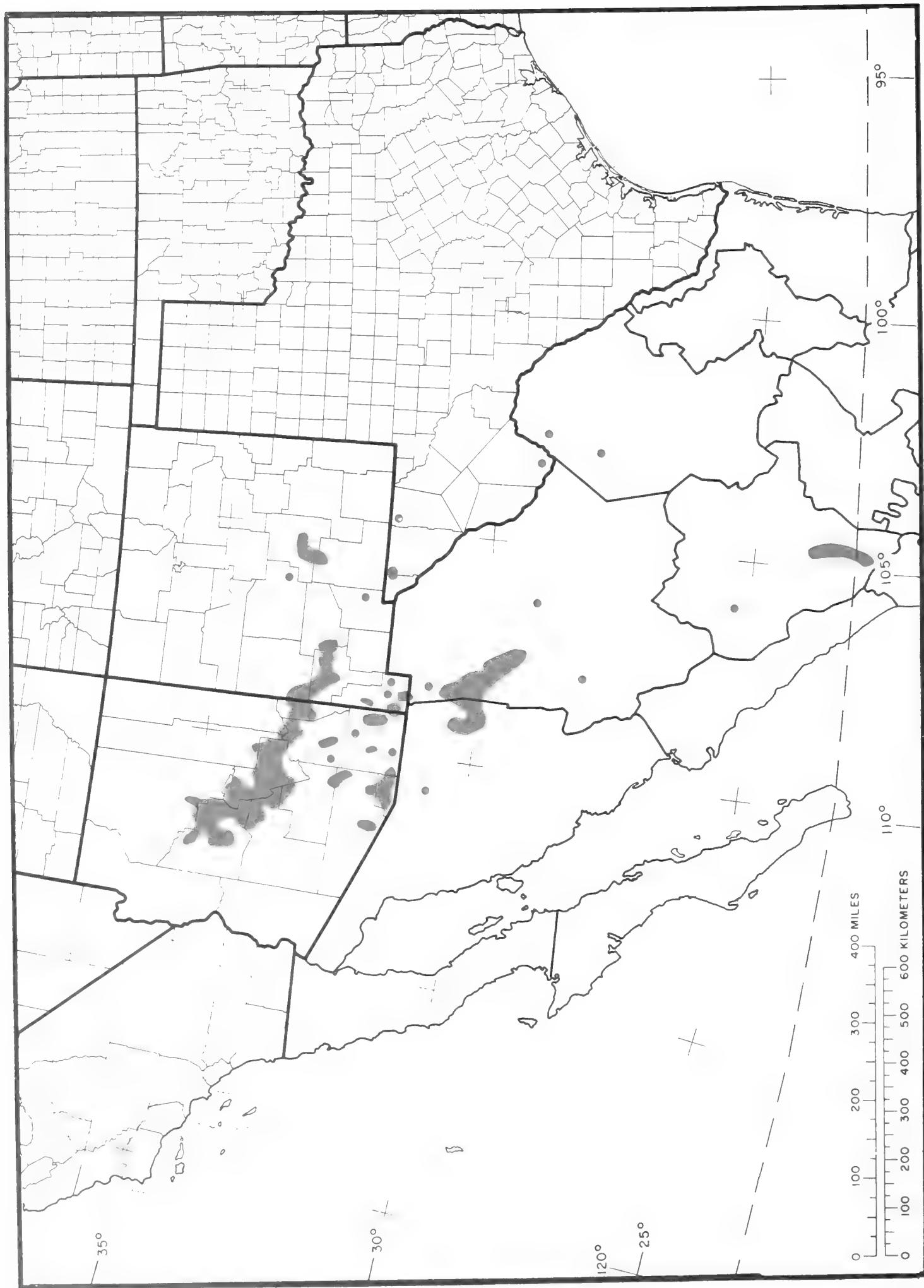
Map 128-SW. *Ptelea trifoliata* L., common hoptree. Eastern range in Volume 4.



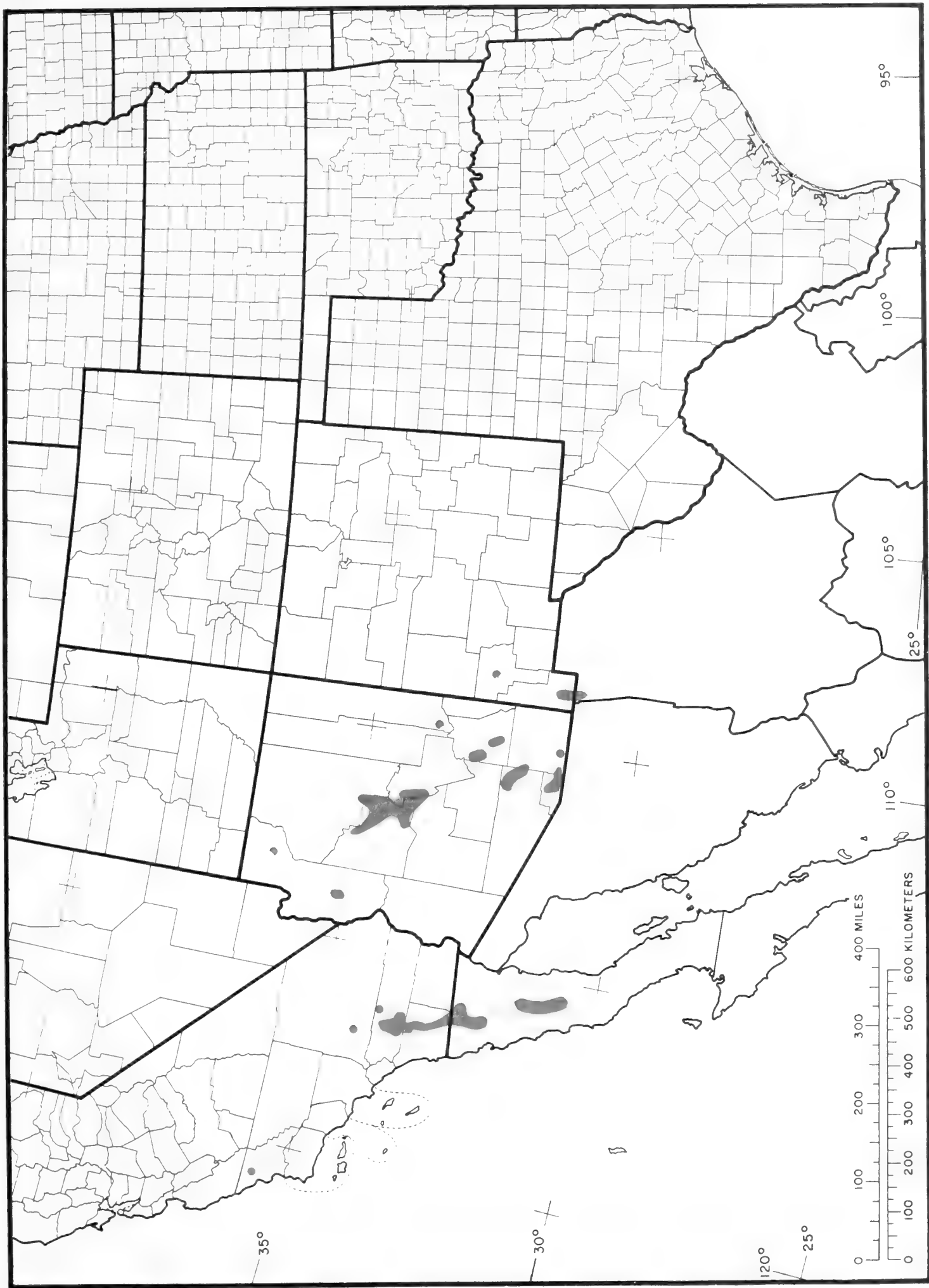
Map 129. *Ptelea crenulata* Greene, California hoptree. California only.



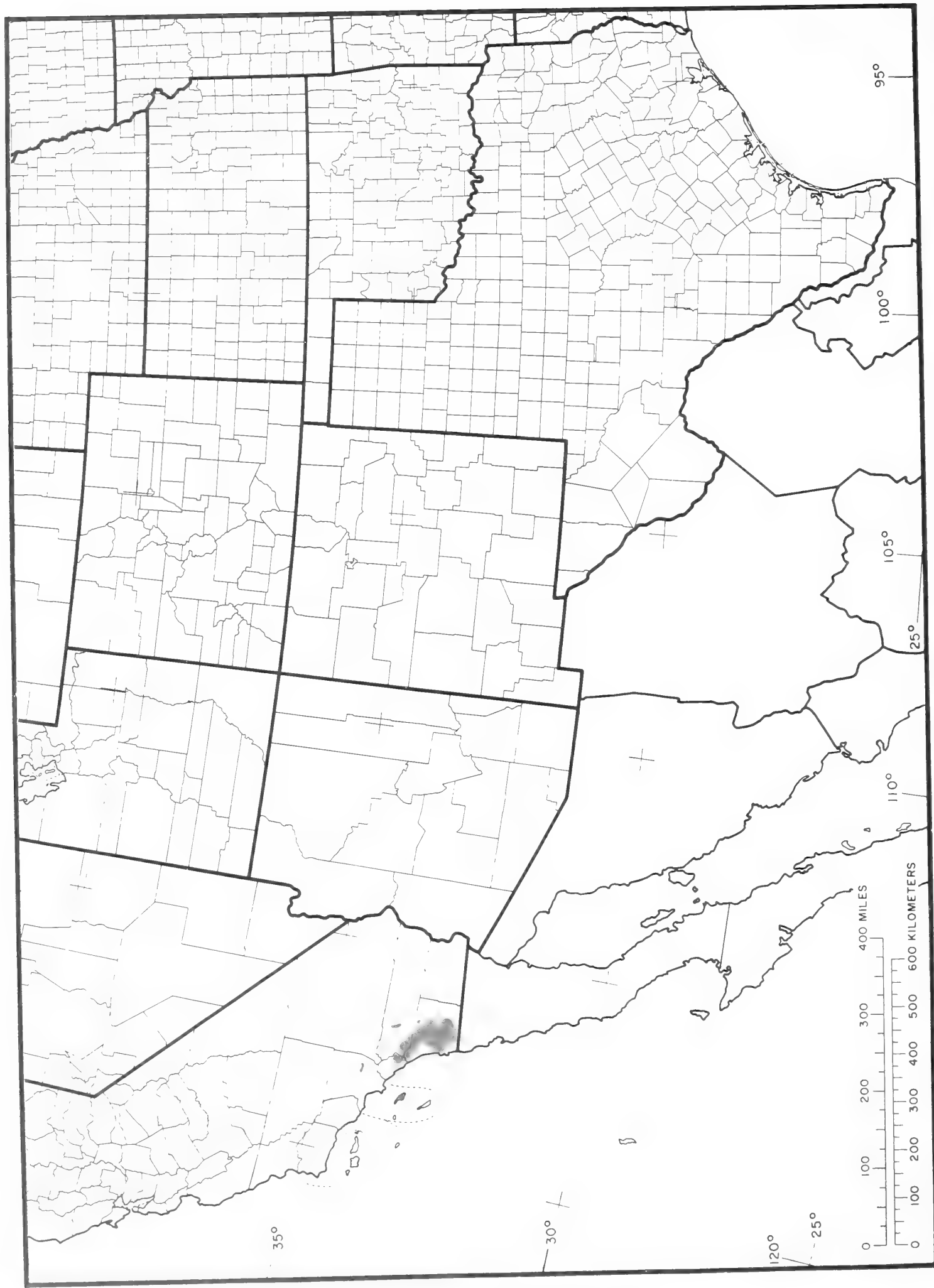
Map 130. *Quercus ajoensis* C. H. Muller, Ajo oak. Southwestern Mexico and Baja California only.



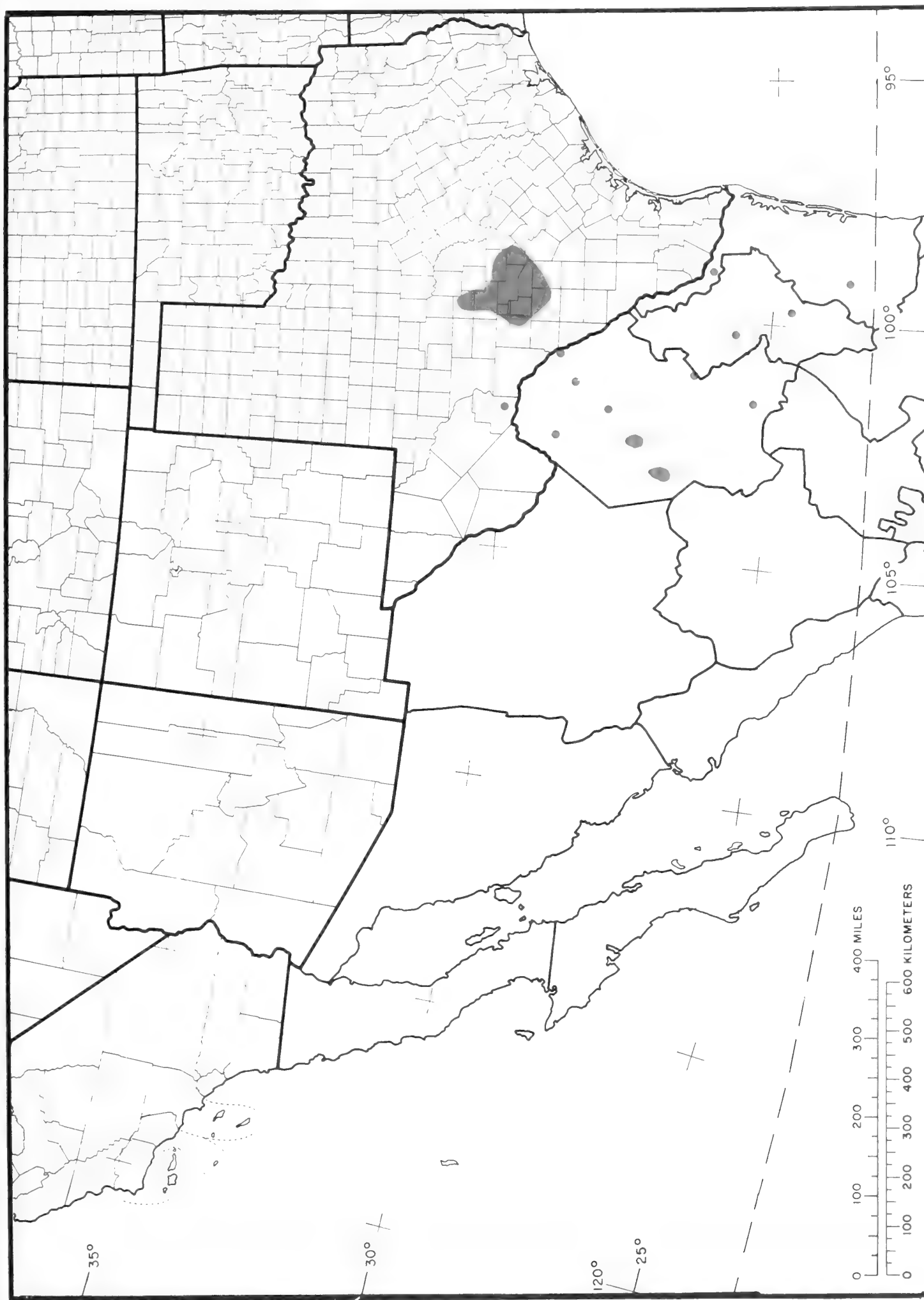
Map 131. *Quercus arizonica* Sarg., Arizona white oak.



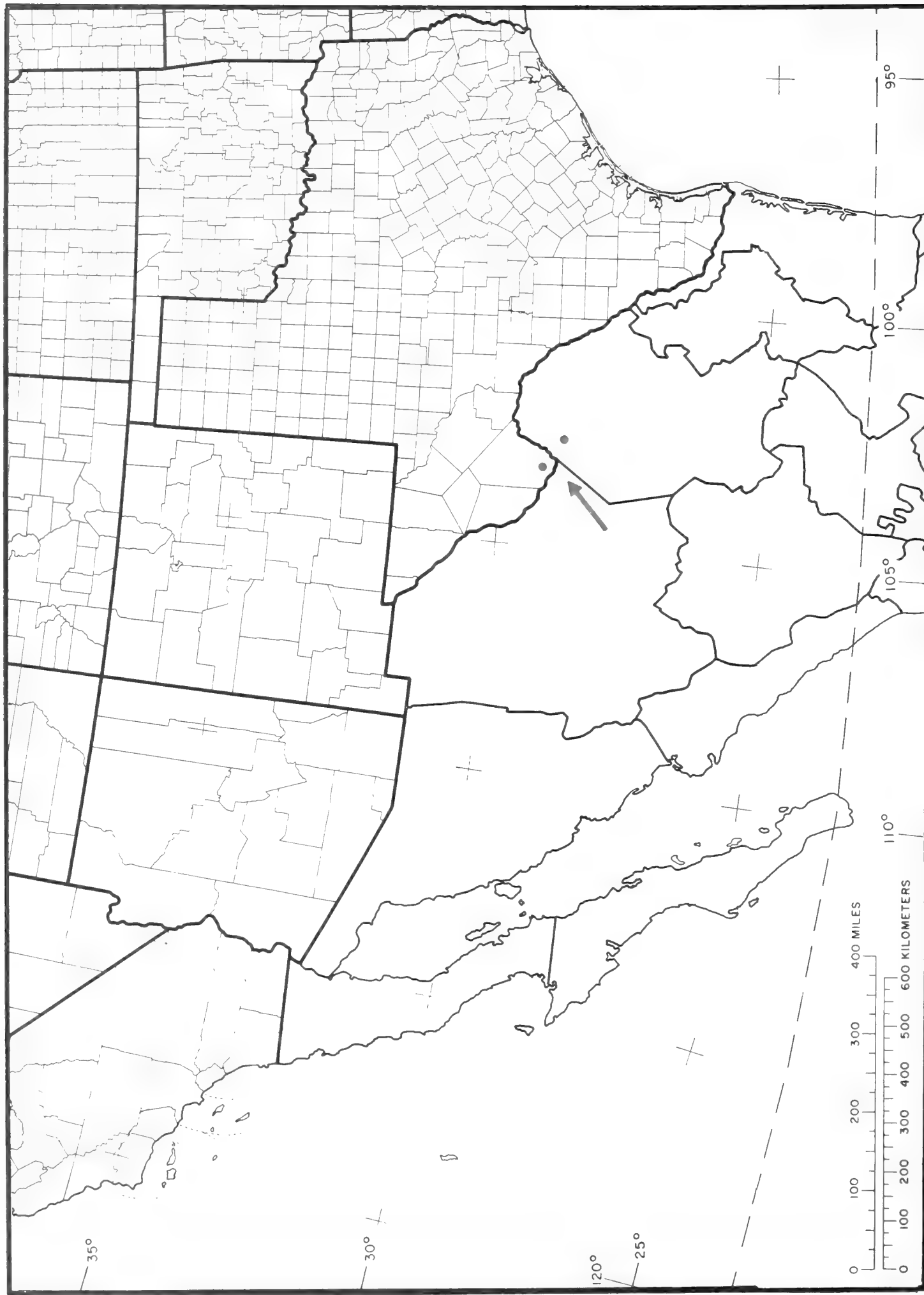
Map 132. *Quercus dunni* Kellogg, Dunn oak.



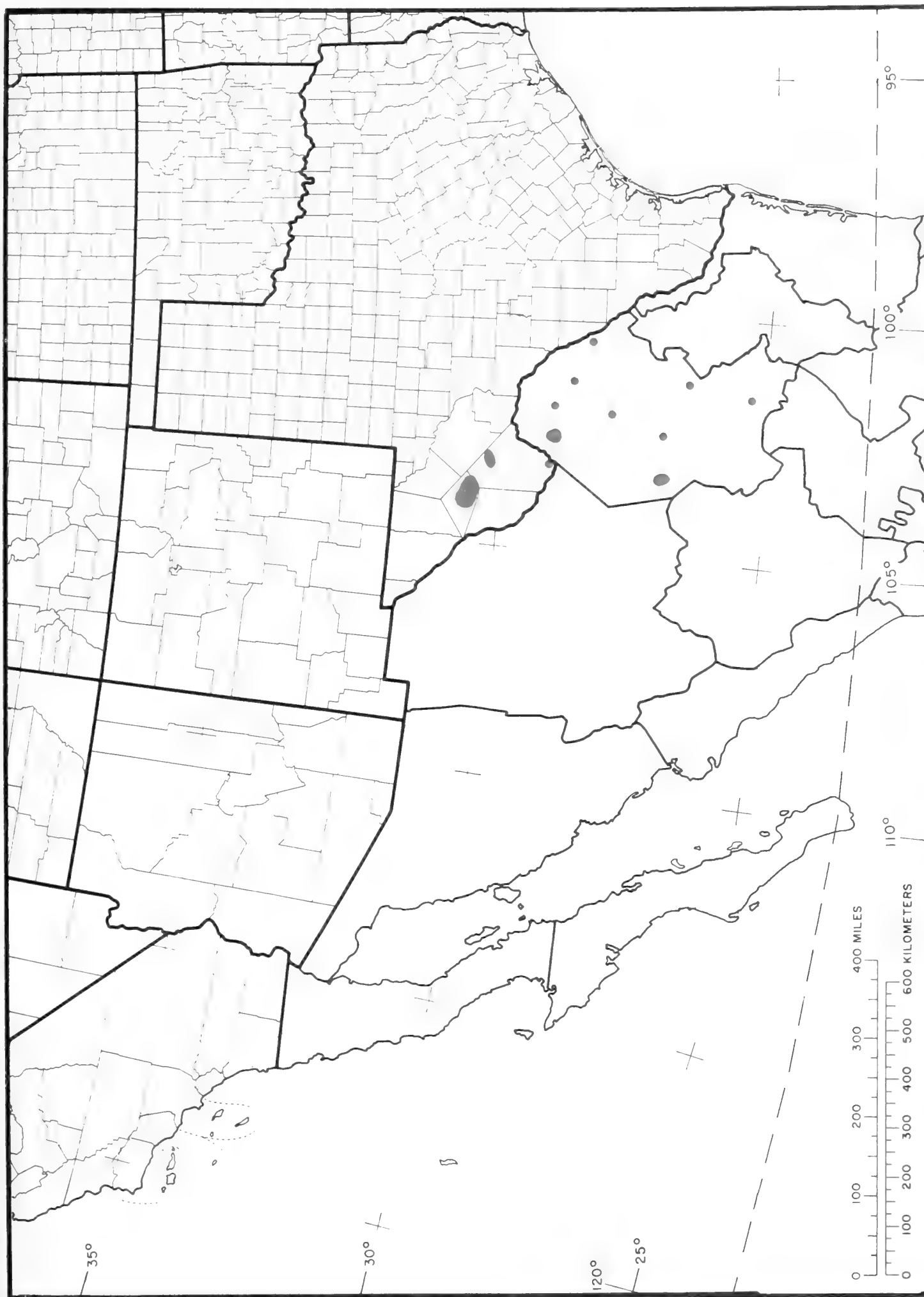
Map 133. *Quercus engelmannii* Greene, Engelmann oak. Southwestern California including Santa Catalina Island only.



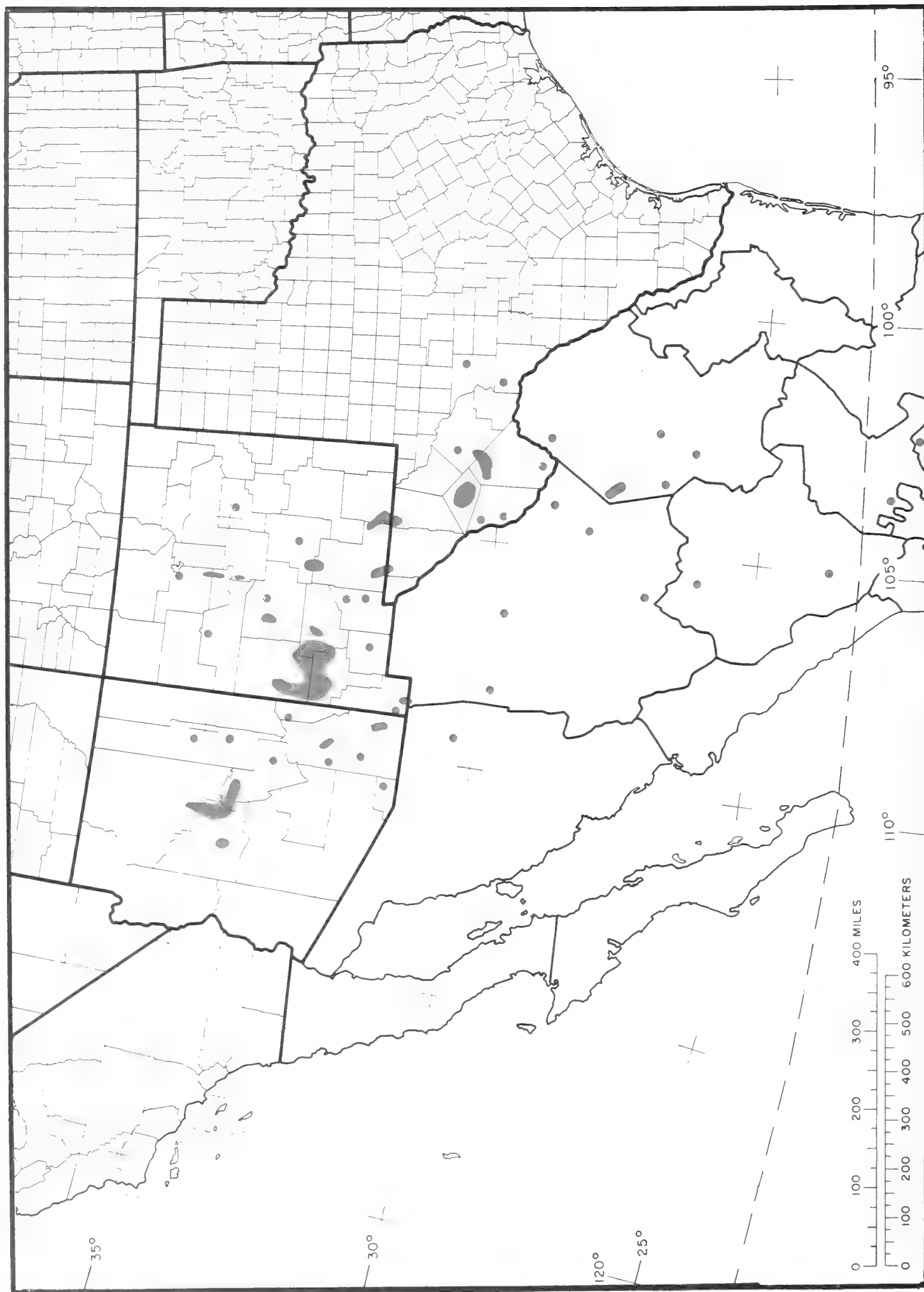
Map 134. *Quercus glaucooides* Mart. & Gal., Lacey oak. Texas and northeastern Mexico only.



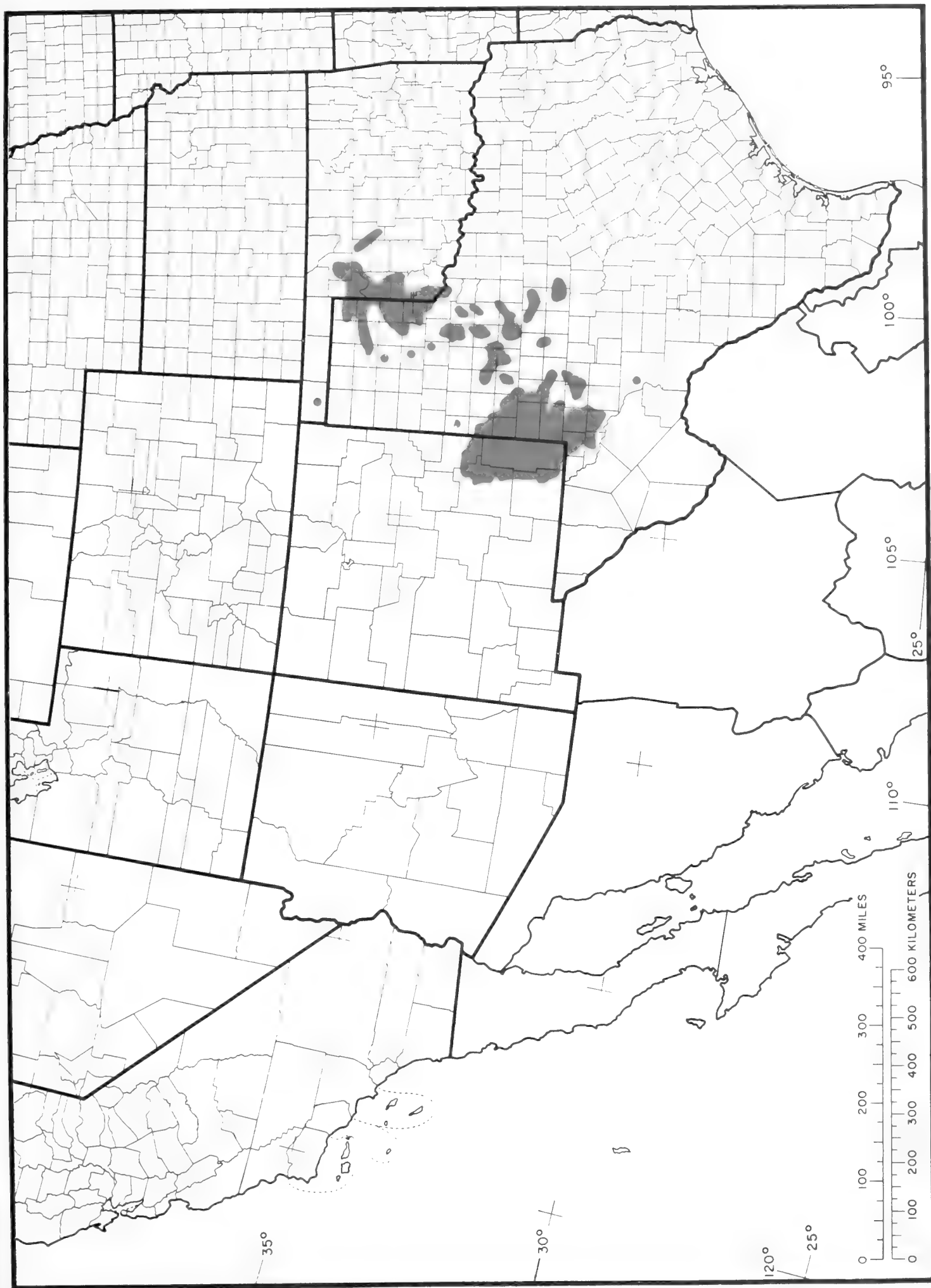
Map 135. *Quercus graciliformis* C. H. Muller, Chisos oak. Chisos Mountains, Texas, and Sierra del Carmen, Coahuila, only.



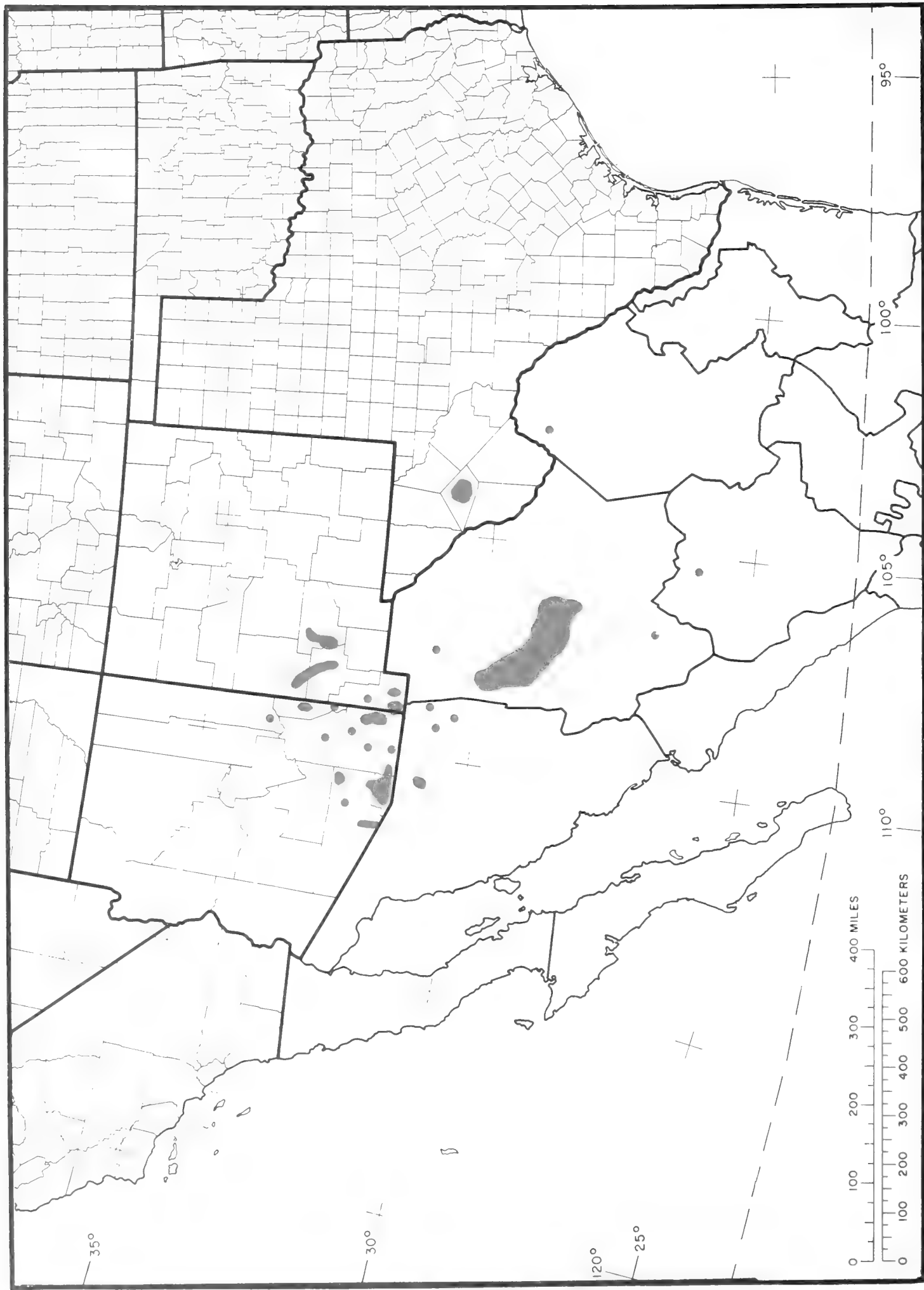
Map 136. *Quercus gravesii* Sudw.. Graves oak. Trans-Pecos Texas and Coahuila only. *Quercus tardifolia* C. H. Muller, lateleaf oak, is an incompletely known related species, very rare in Chisos Mountains, southern Brewster County, Texas.



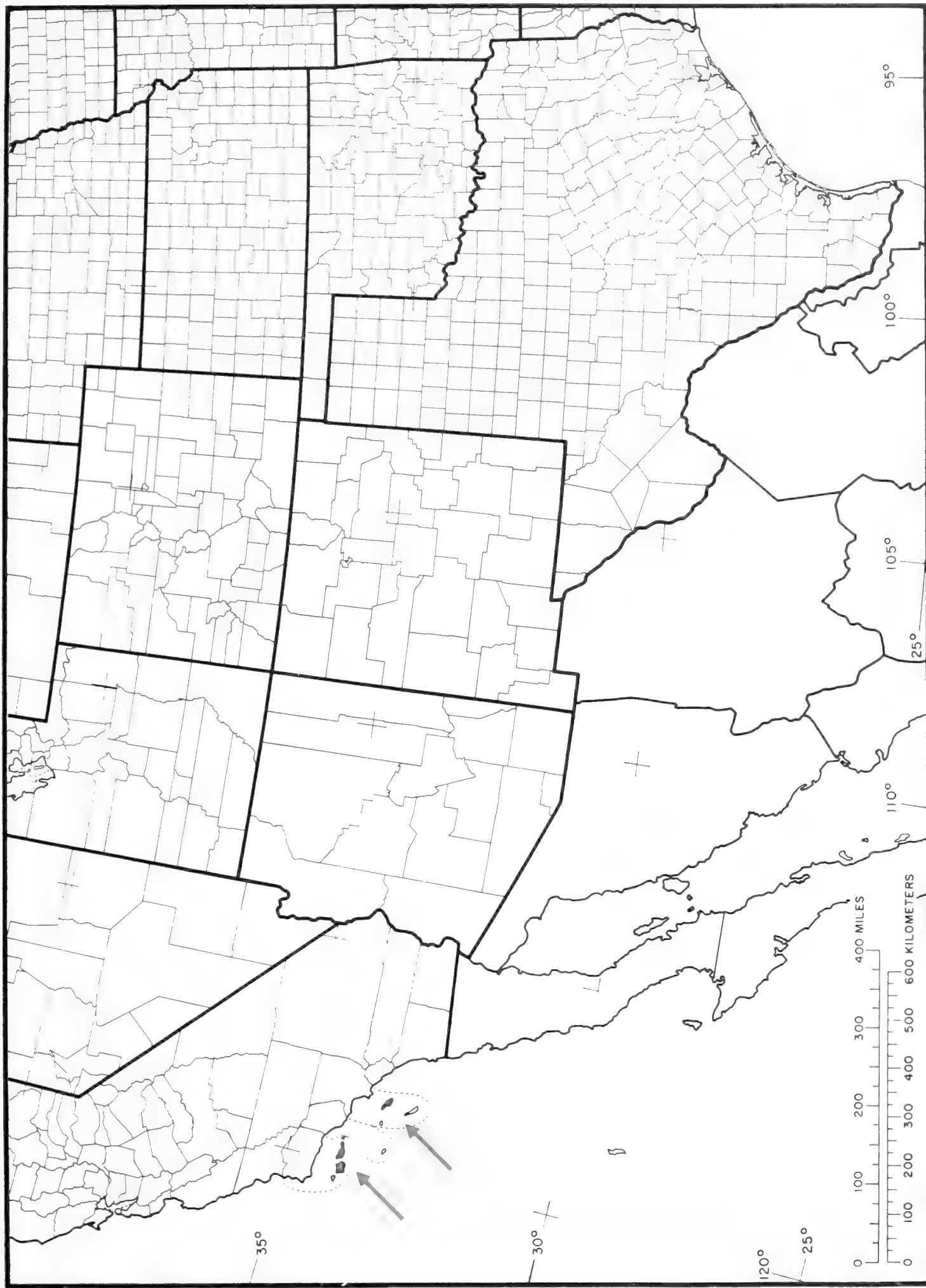
Map 137. *Quercus grisea* Liebmann, gray oak.



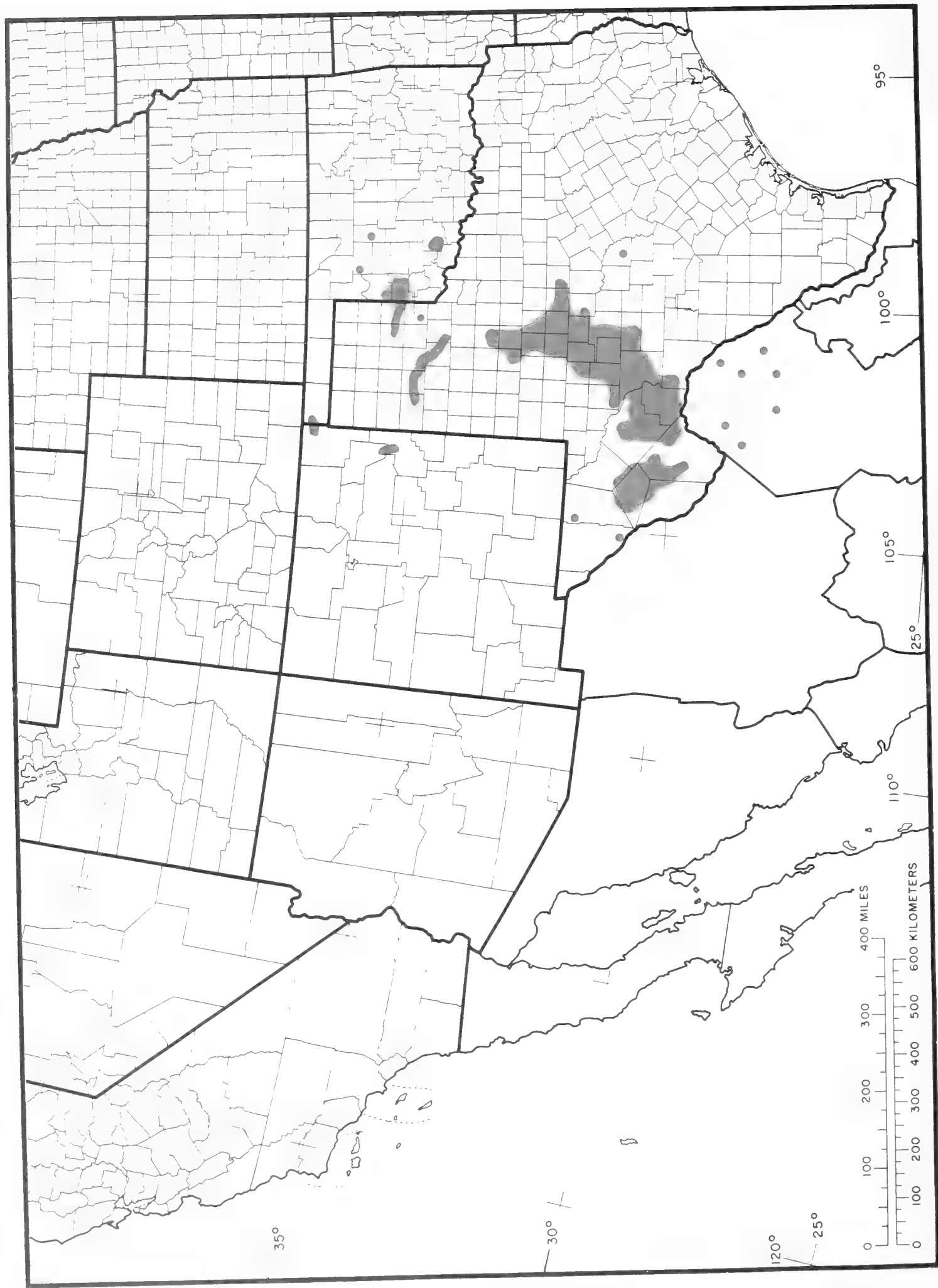
Map 138. *Quercus havardii* Rydb., Havard oak.



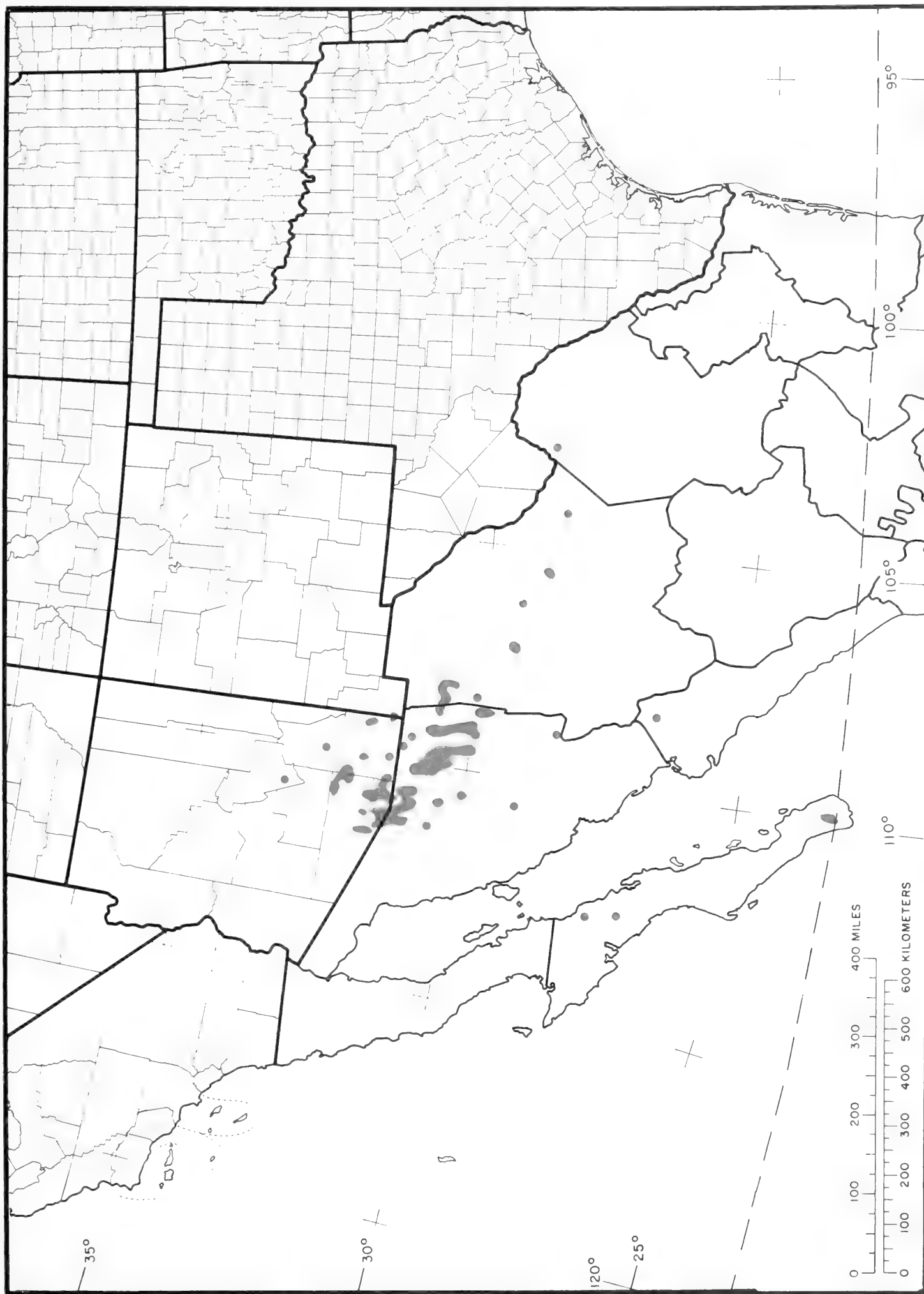
Map 139. *Quercus hypoleucoides* A. Camus, silverleaf oak.



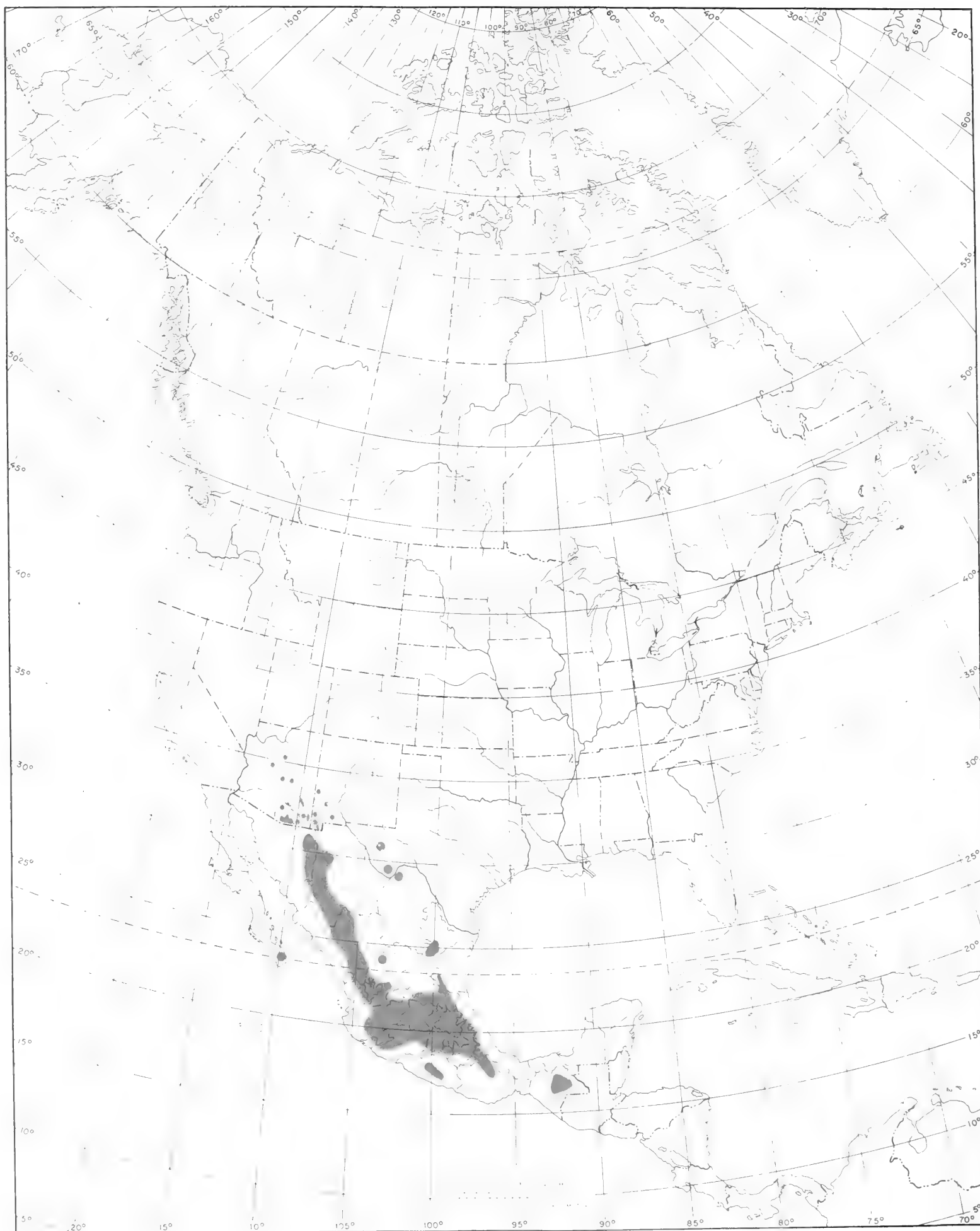
Map 140. *Quercus macdonaldii* Greene, McDonald oak. Santa Rosa, Santa Cruz, and Santa Catalina Islands of California only.



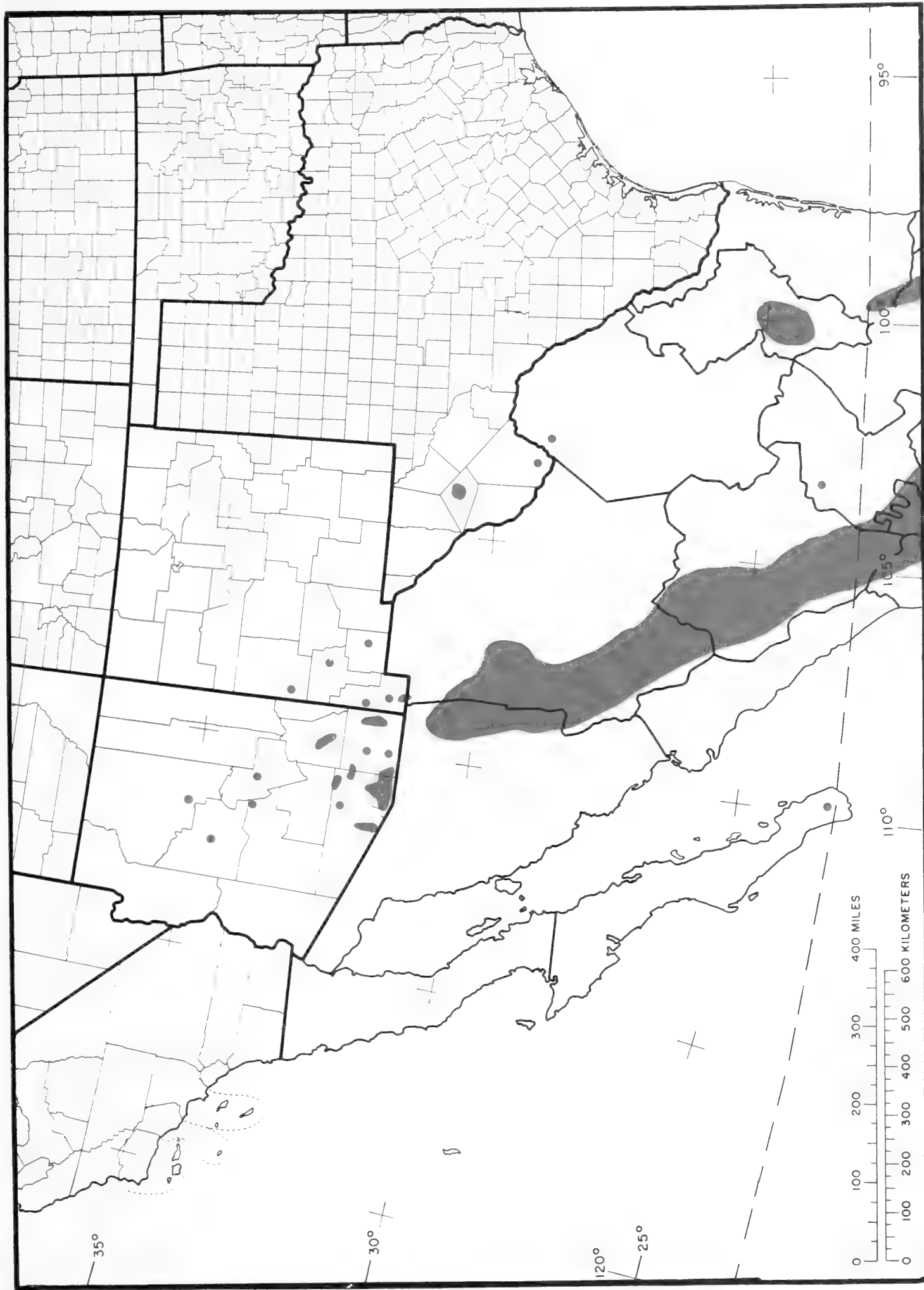
Map 141. *Quercus mohriana* Buckl., Mohrs oak.



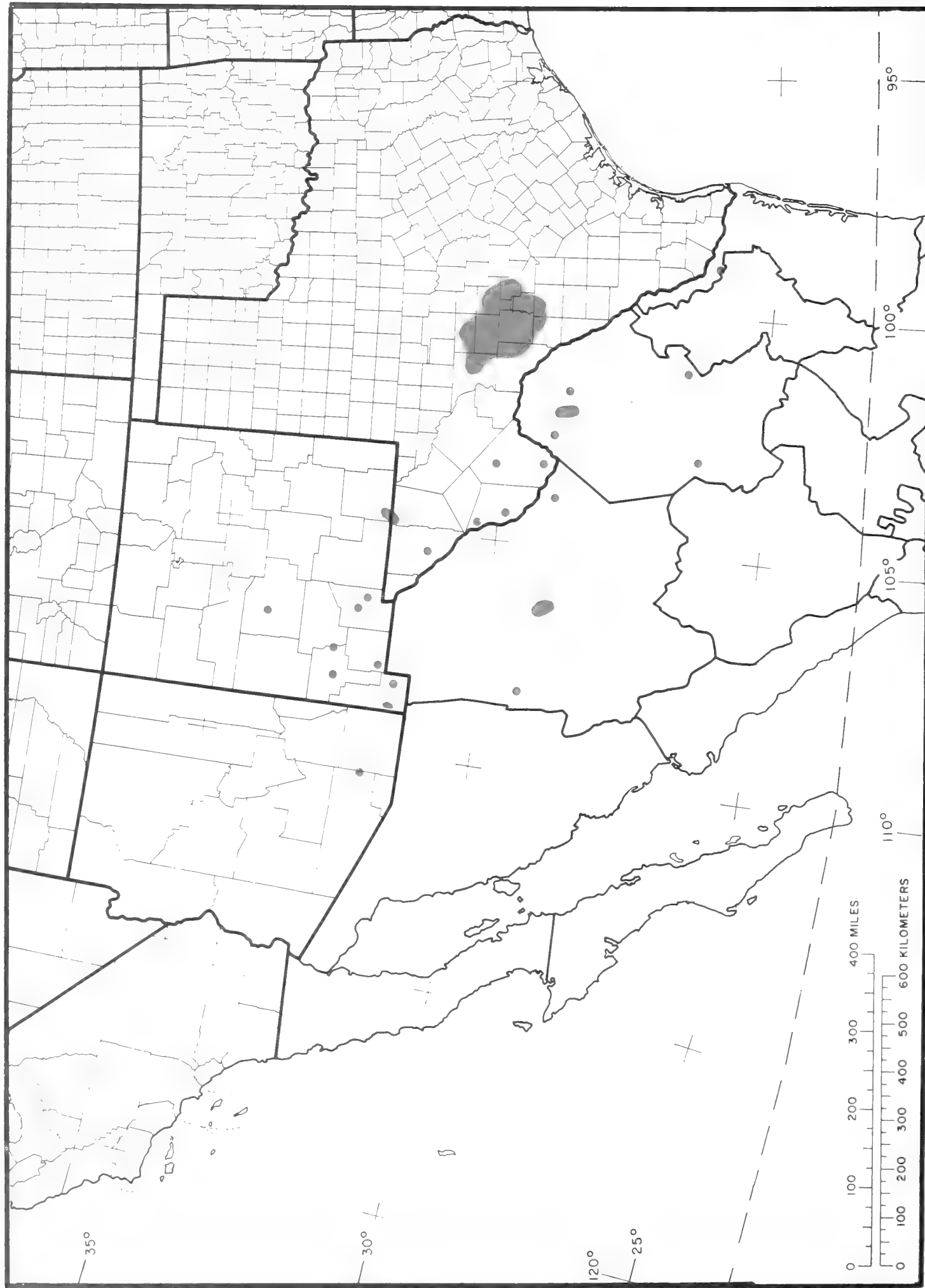
Map 112. *Quercus oblongifolia* Torr., Mexican blue oak. Southeastern Arizona, extreme southwestern New Mexico, and Mexico.



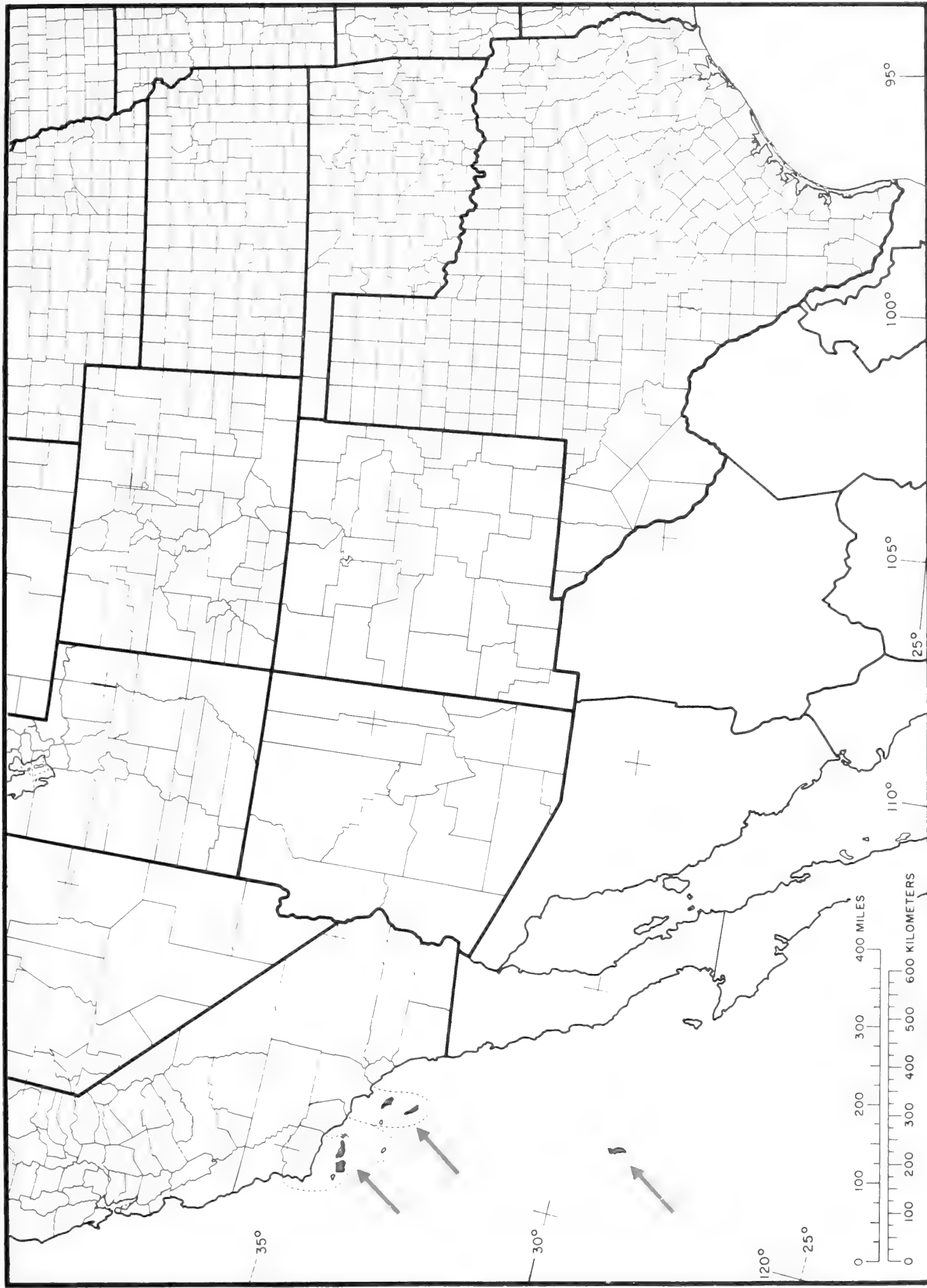
Map 143-N. *Quercus rugosa* Née, netleaf oak.



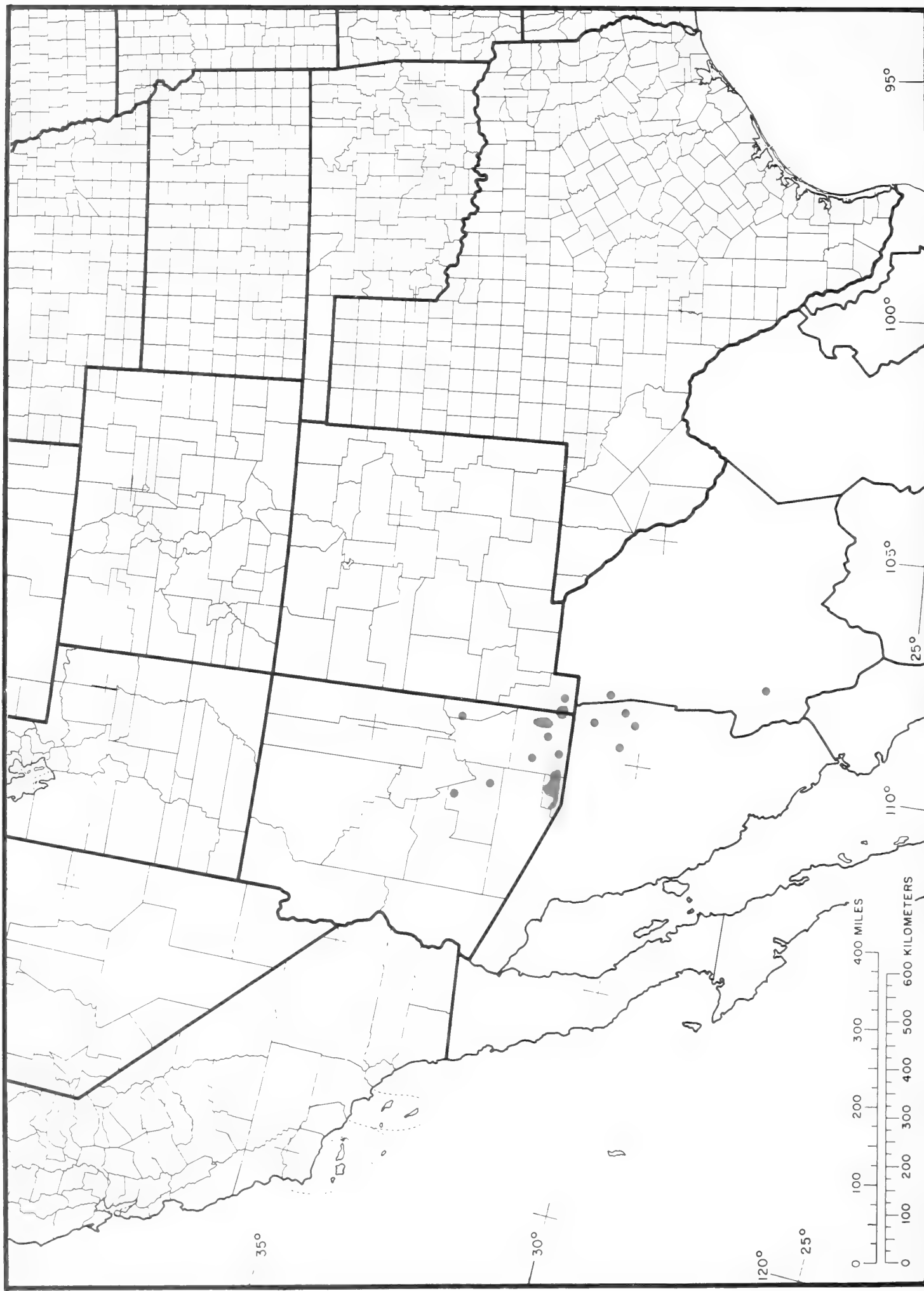
Map 143-SW. *Quercus rugosa* Née, netleaf oak.



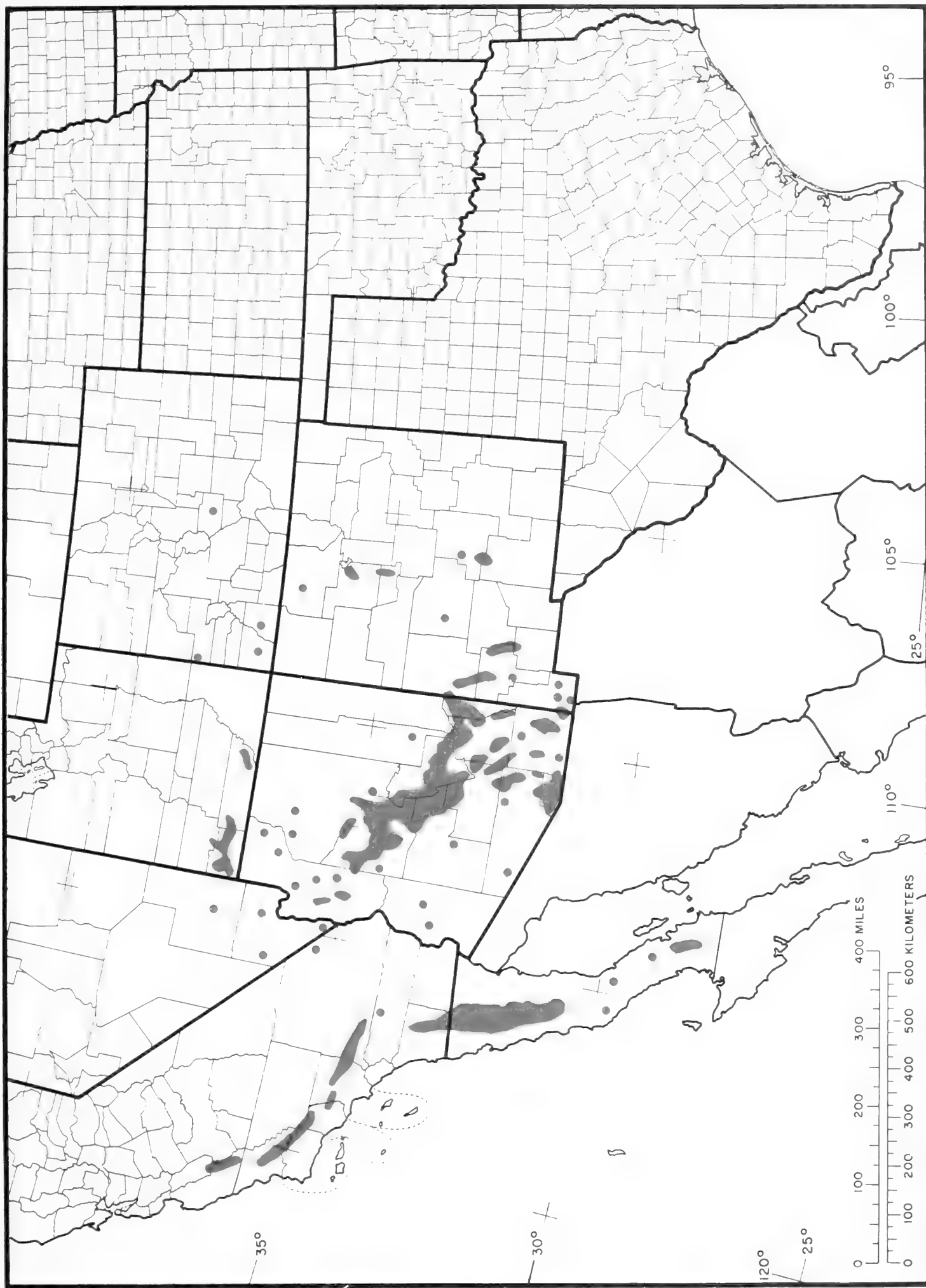
Map 144. *Quercus pungens* Liebmannii, sandpaper oak.



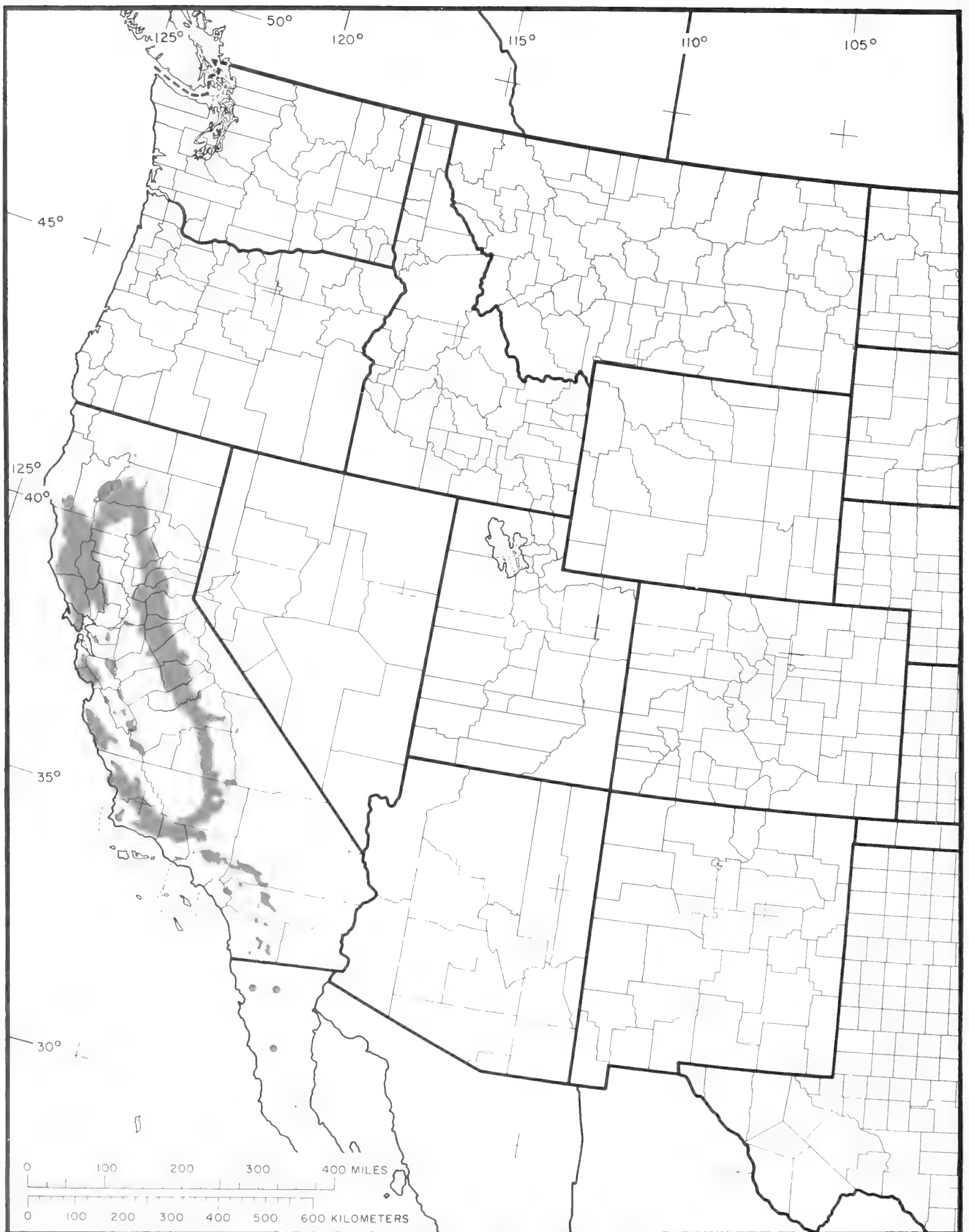
Map 145. *Quercus tomentella* Engelm., island live oak. Santa Rosa, Santa Cruz, Anacapa, Santa Catalina, and San Clemente Islands of California and Guadalupe Island of Baja California only.



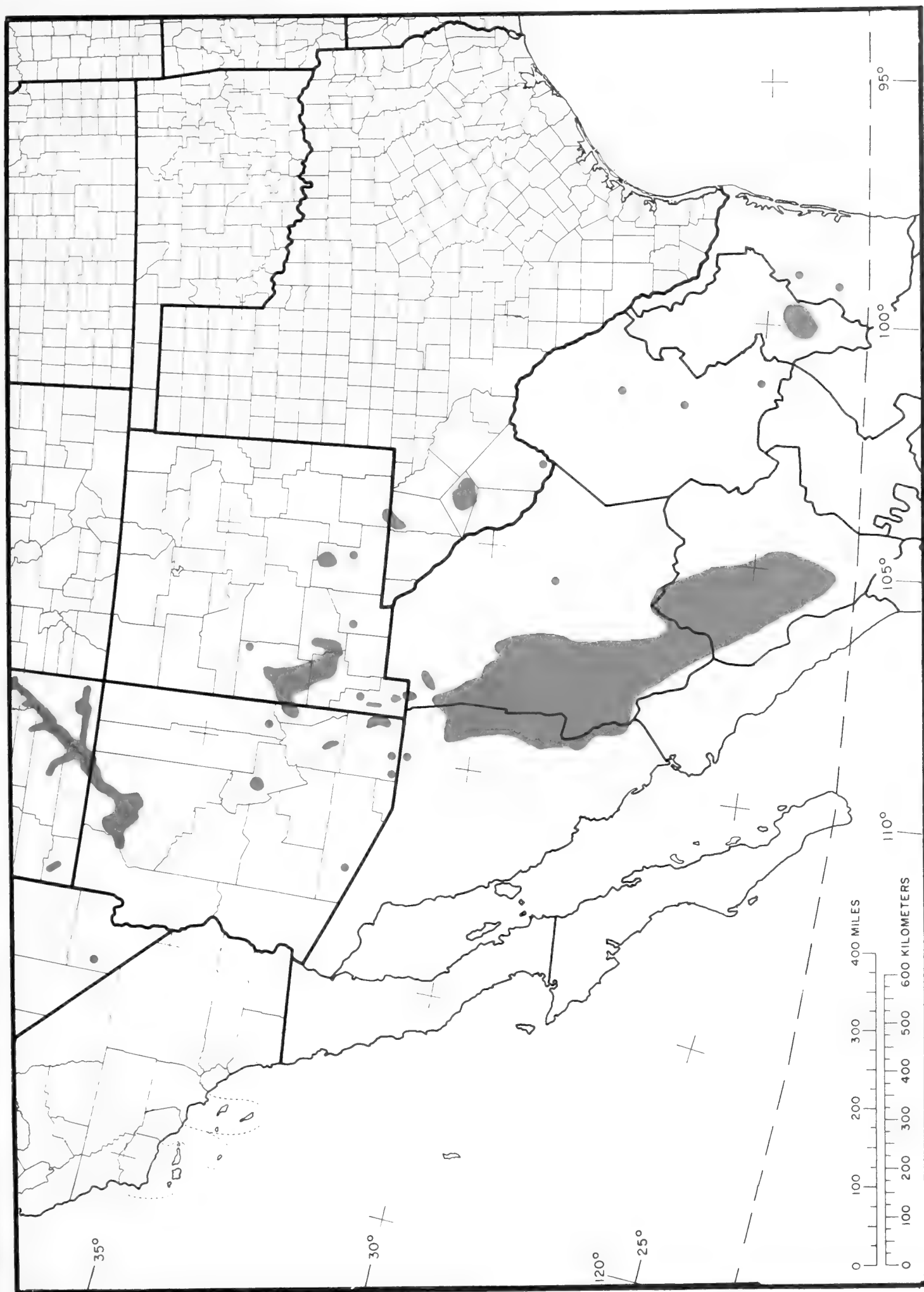
Map 146. *Quercus toumeyi* Sarg., Toumey oak. Southeastern Arizona, extreme southwestern New Mexico, Chihuahua, and Sonora.



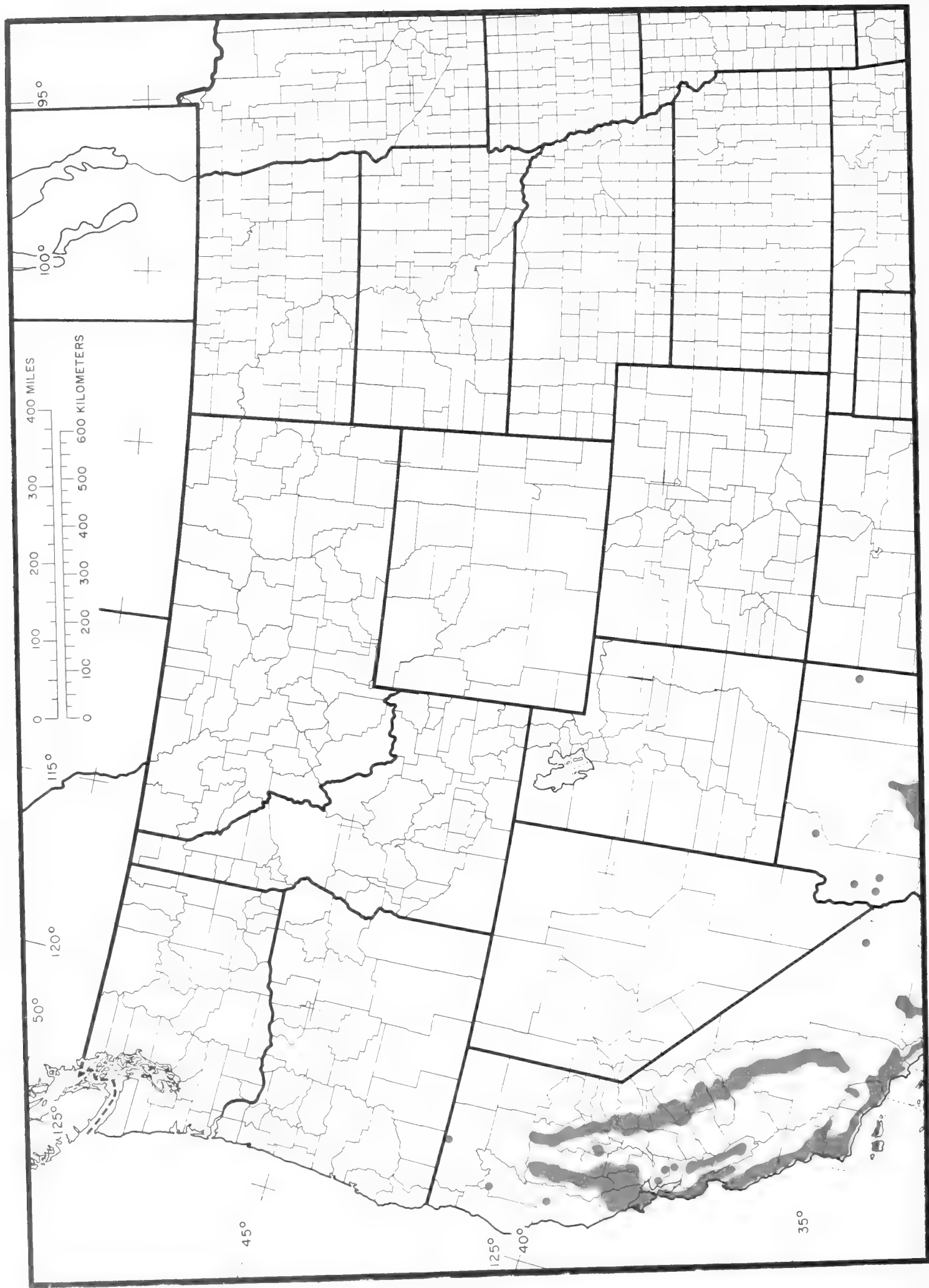
Map 147. *Quercus turbinella* Greene, shrub live oak.



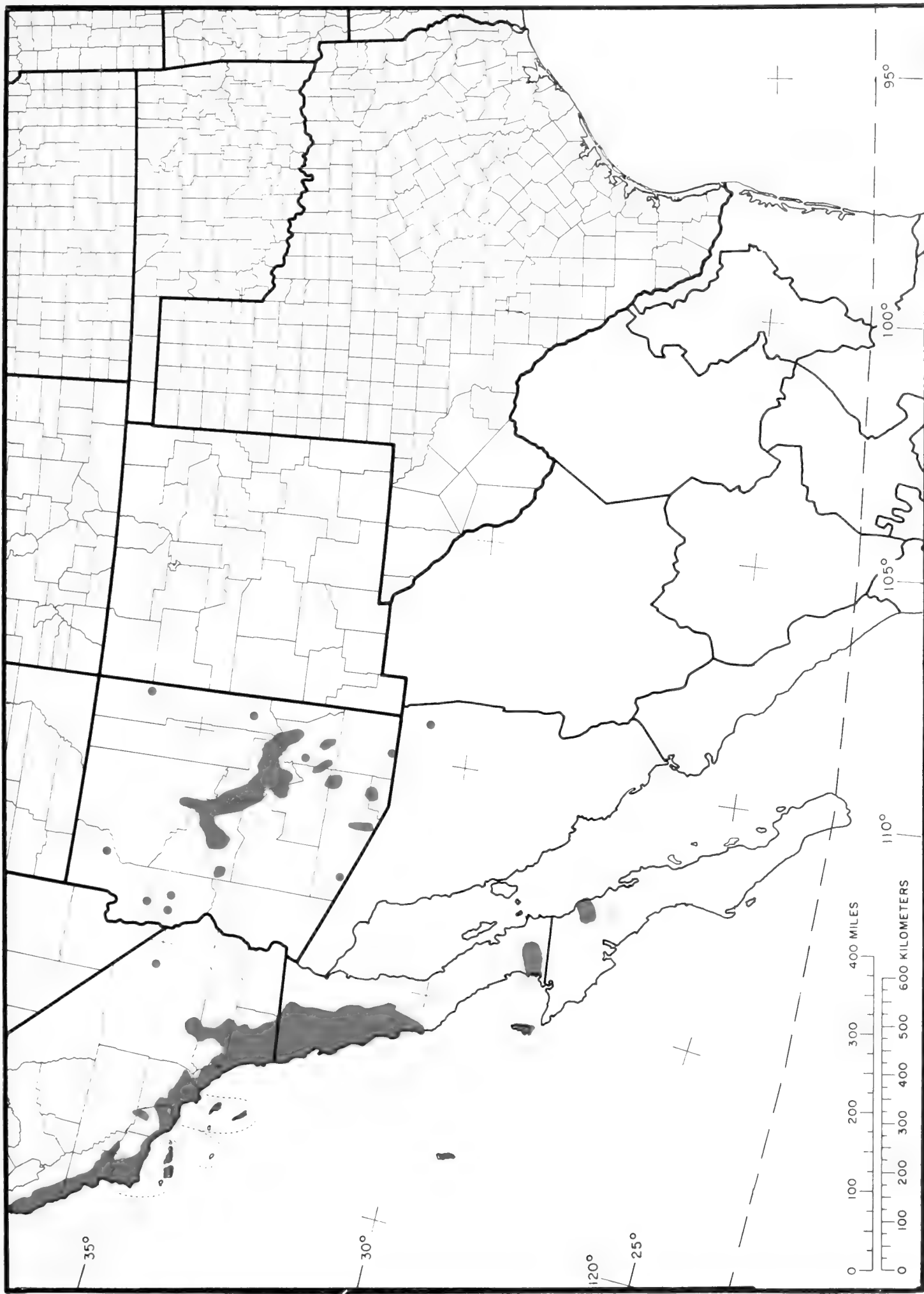
Map 148. *Quercus wislizeni* A. DC., interior live oak.



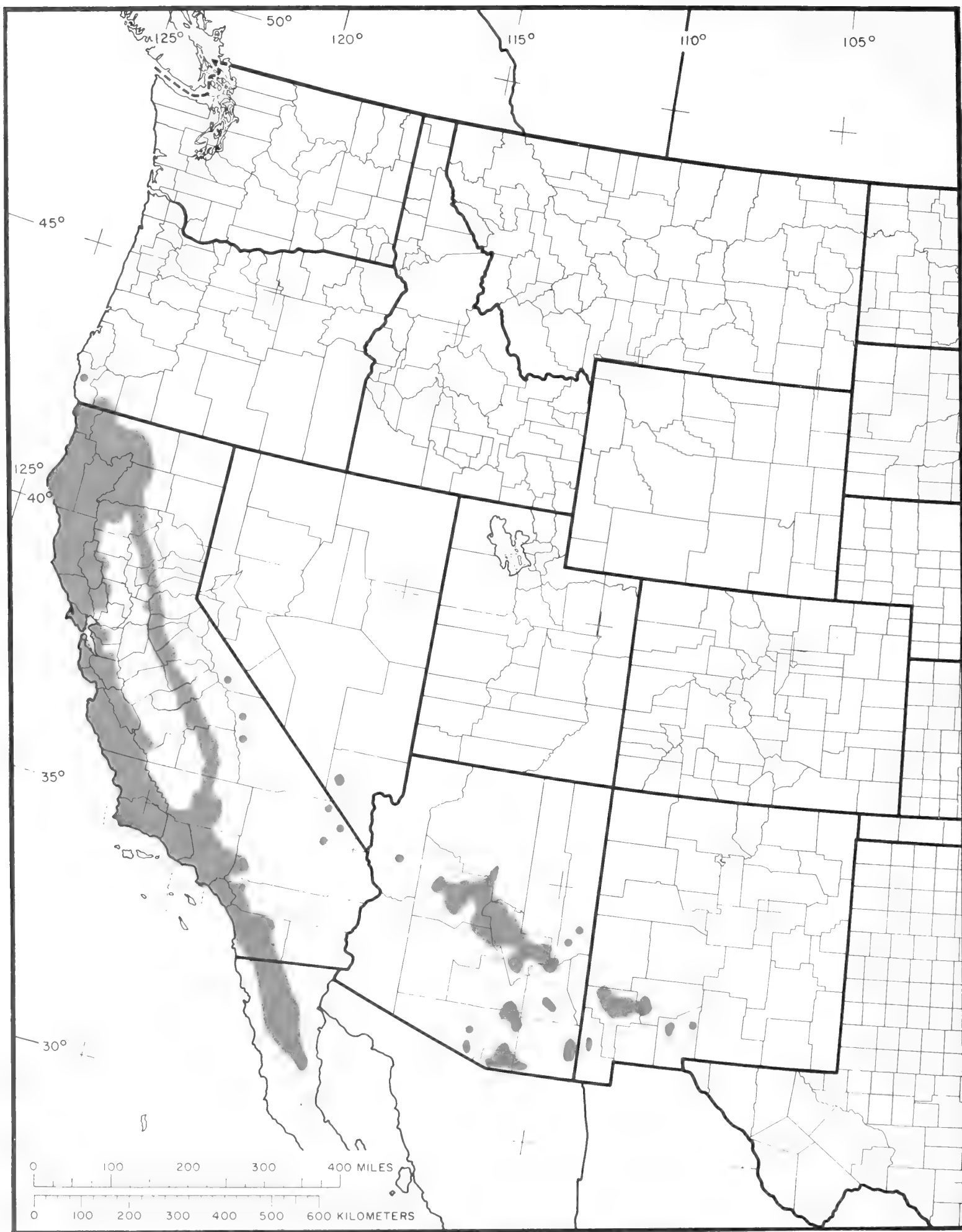
Map 149. *Rhamnus betulae[olia] Greene*, birchleaf buckthorn.



Map 150-NW. *Rhamnus crocea* Nutt., hollyleaf buckthorn, northern range.



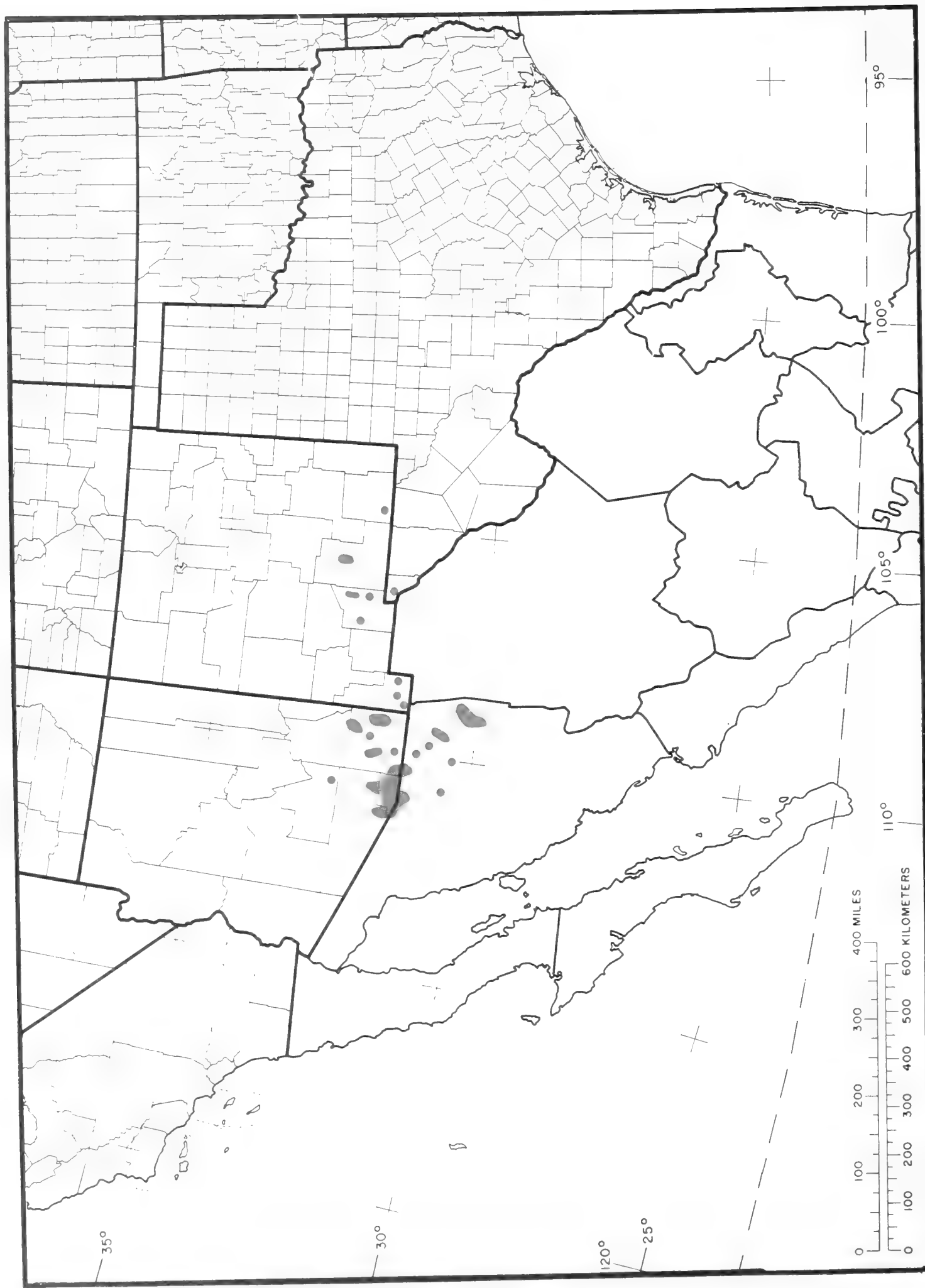
Map 150-SW. *Rhamnus crocea* Nutt., hollyleaf buckthorn, southern range.



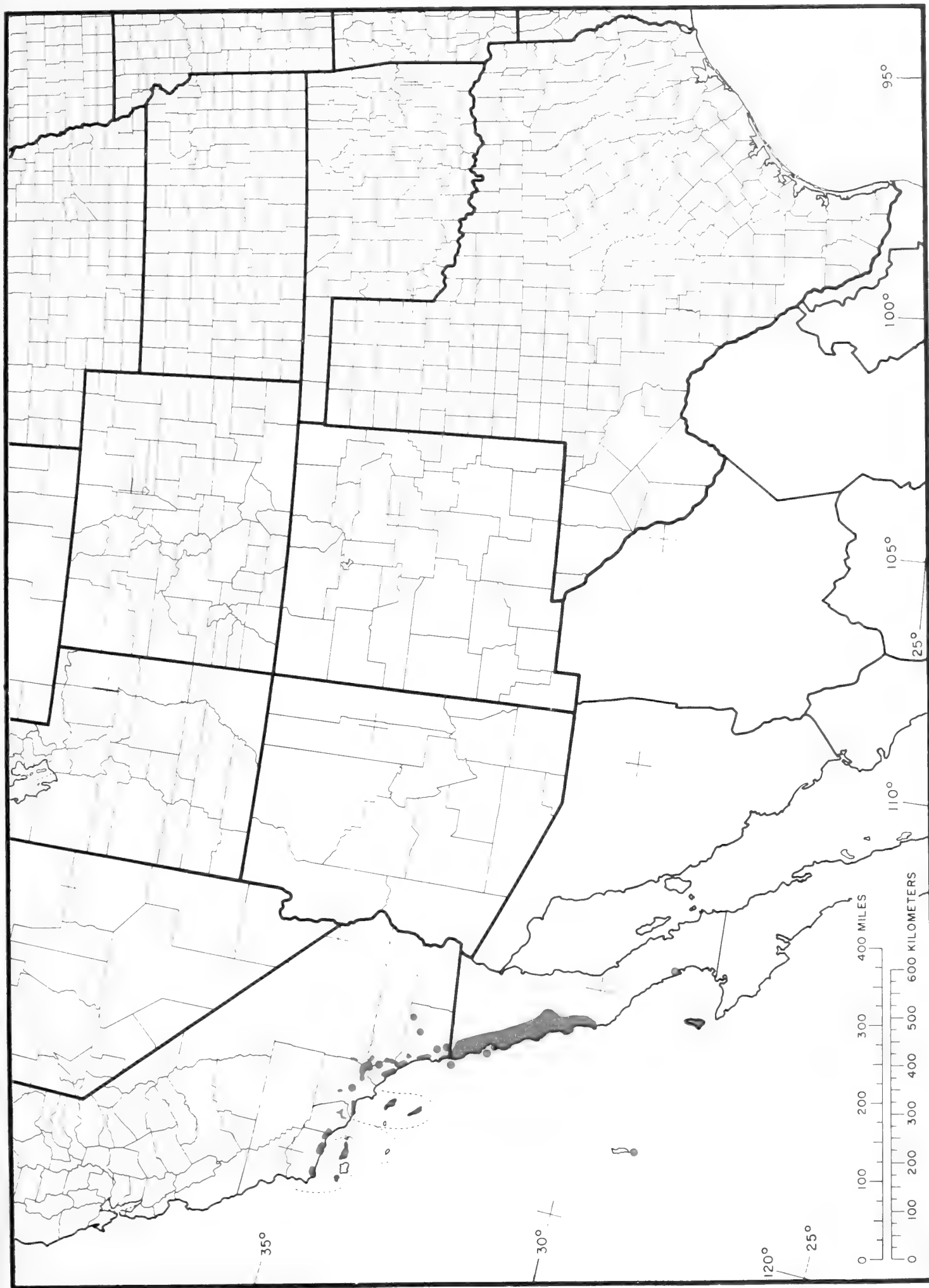
Map 151. *Rhamnus californica* Eschsch., California buckthorn.



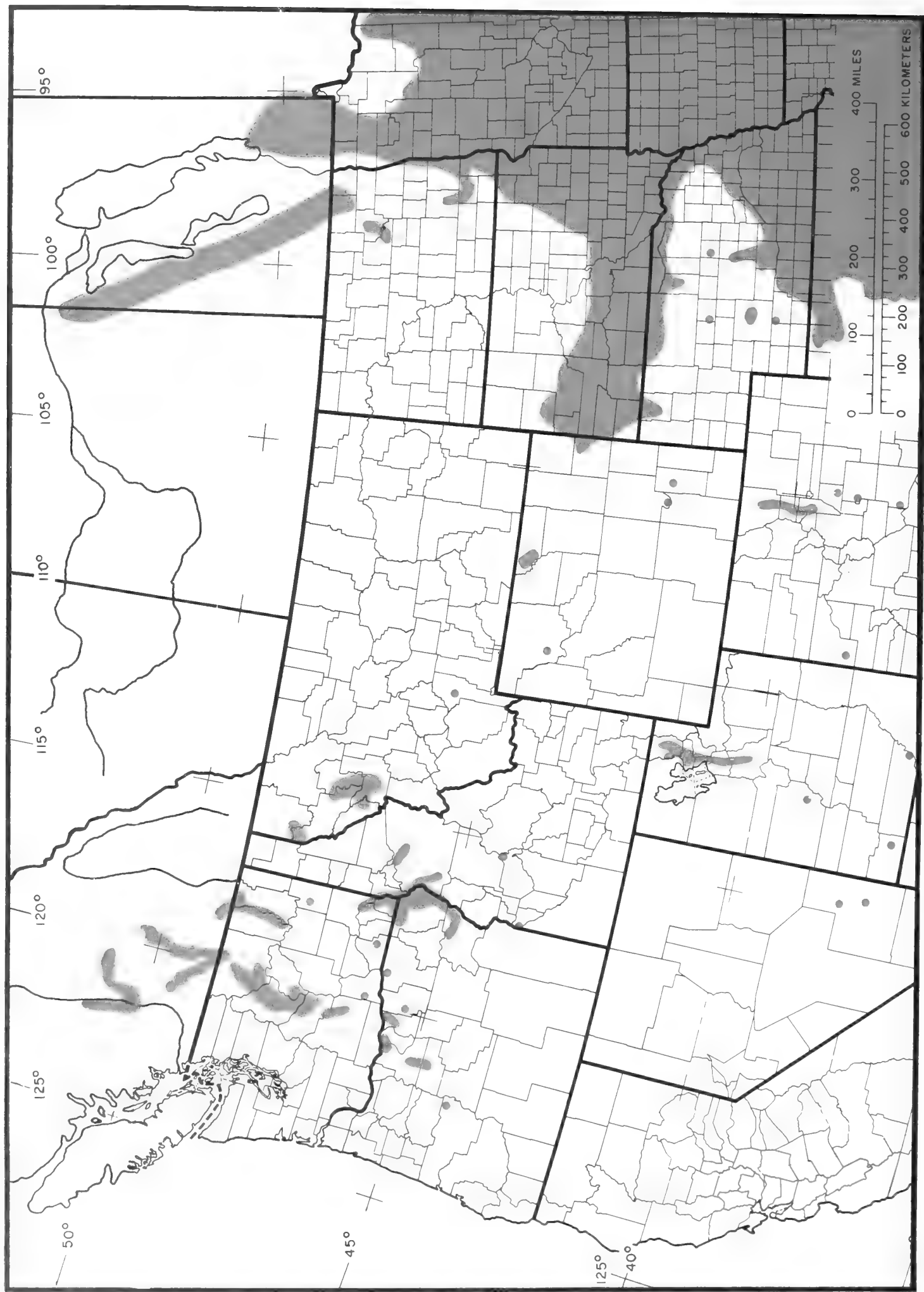
Map 152. *Rhododendron macrophyllum* D. Don, Pacific rhododendron.



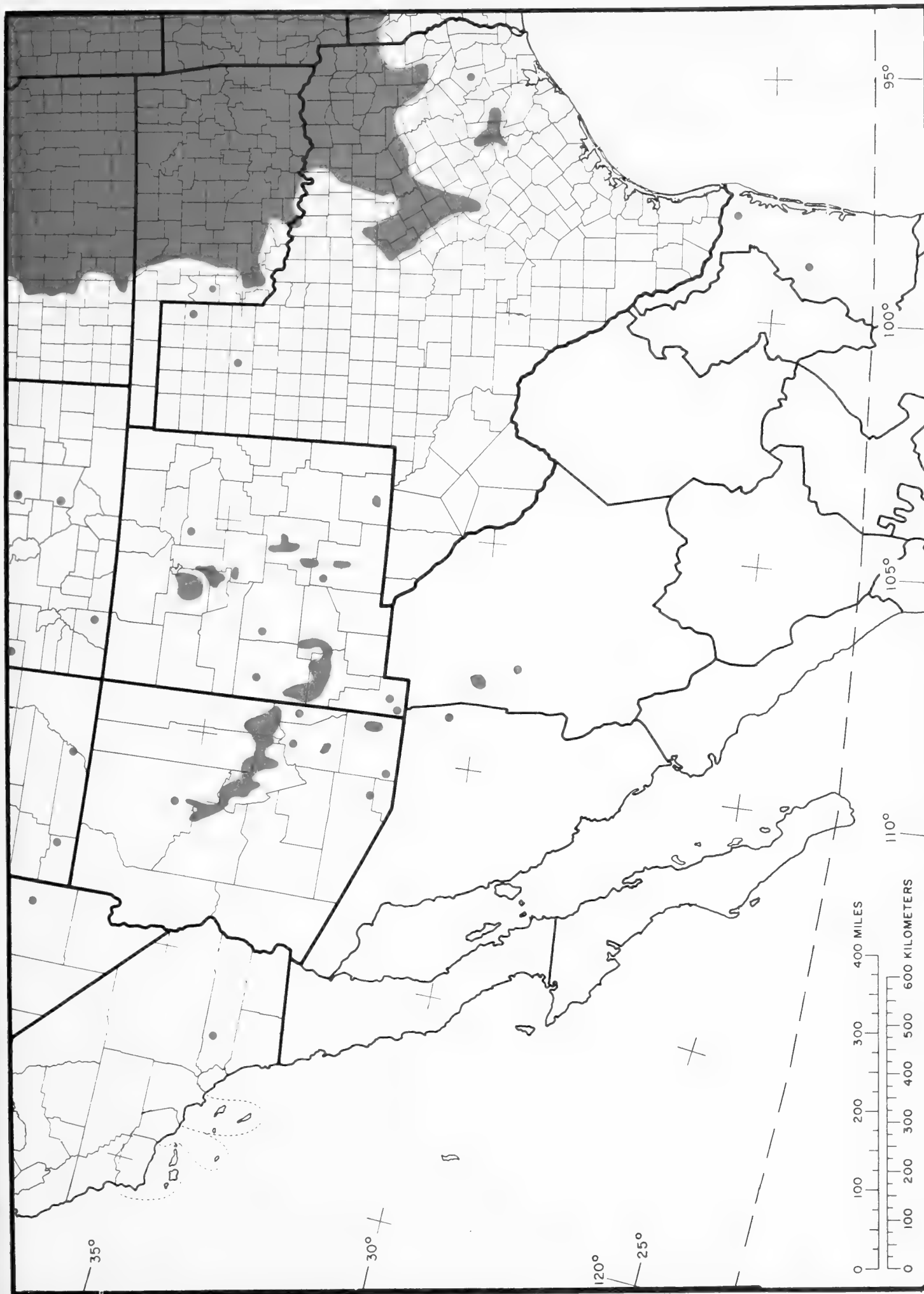
Map 153. *Rhus choriophylla* Woot. & Standl., Mearns sumac. Trans-Pecos Texas, southern New Mexico, southeastern Arizona, Sonora, and Chihuahua.



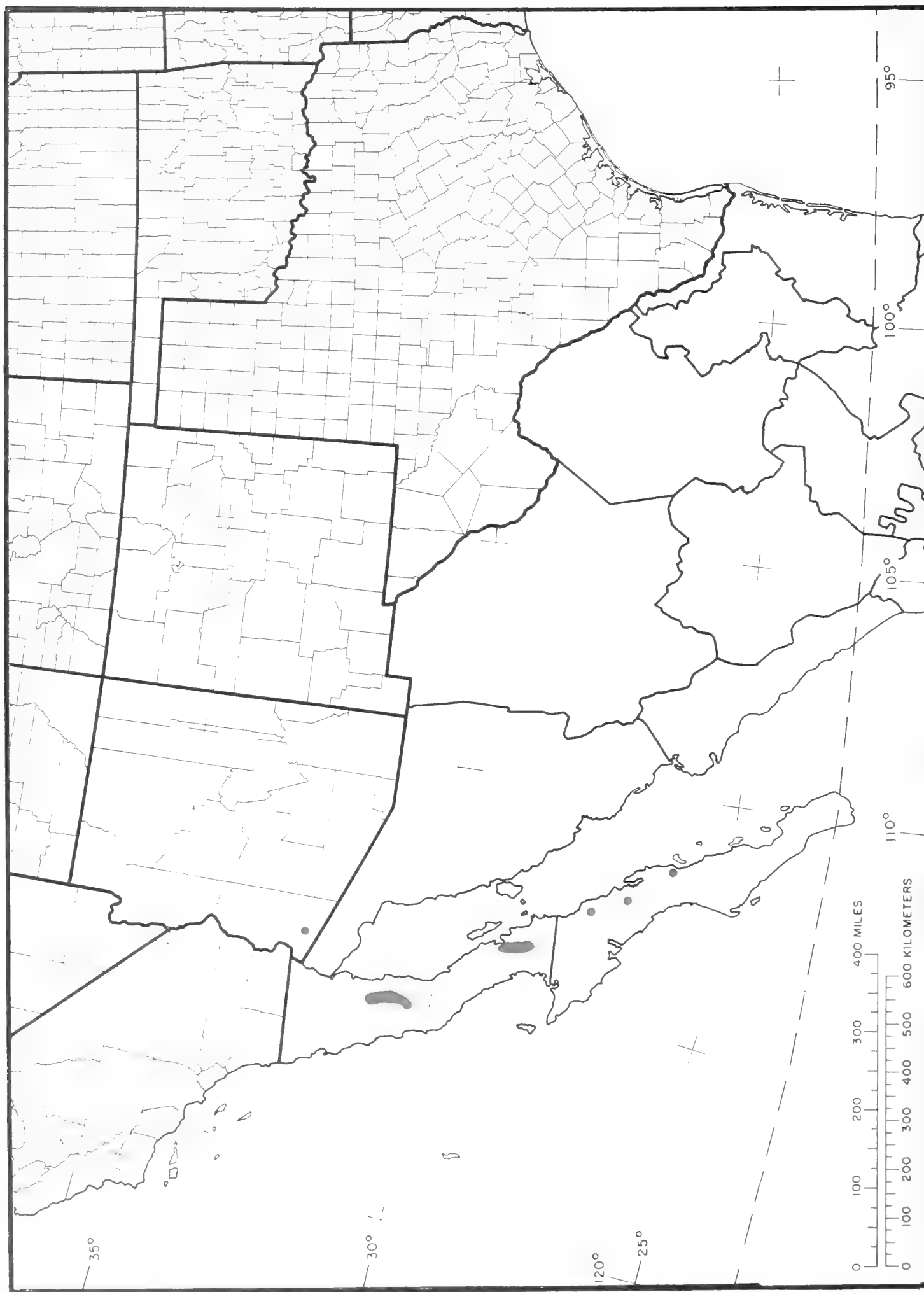
Map 154. *Rhus integrifolia* (Nutt.) Benth. & Hook. f., lemonade sumac. Coastal southern California including San Miguel, Santa Cruz, Santa Catalina, and San Clemente Islands. Also Baja California including Cedros Island and Outer Islet south of Guadalupe Island.



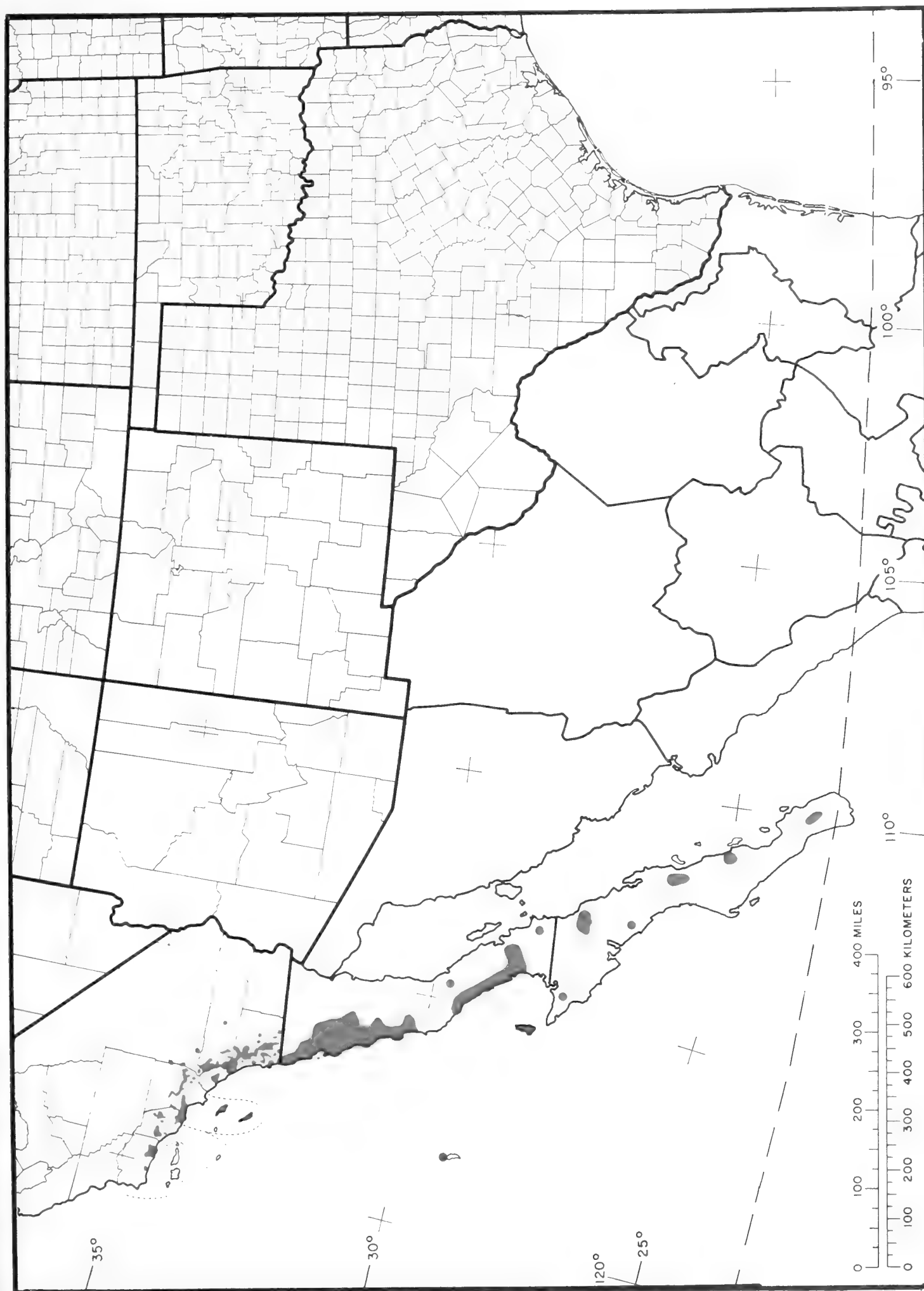
Map 155-NW. *Rhus glabra* L., smooth sumac, northwestern range. Eastern range in Volume 4.



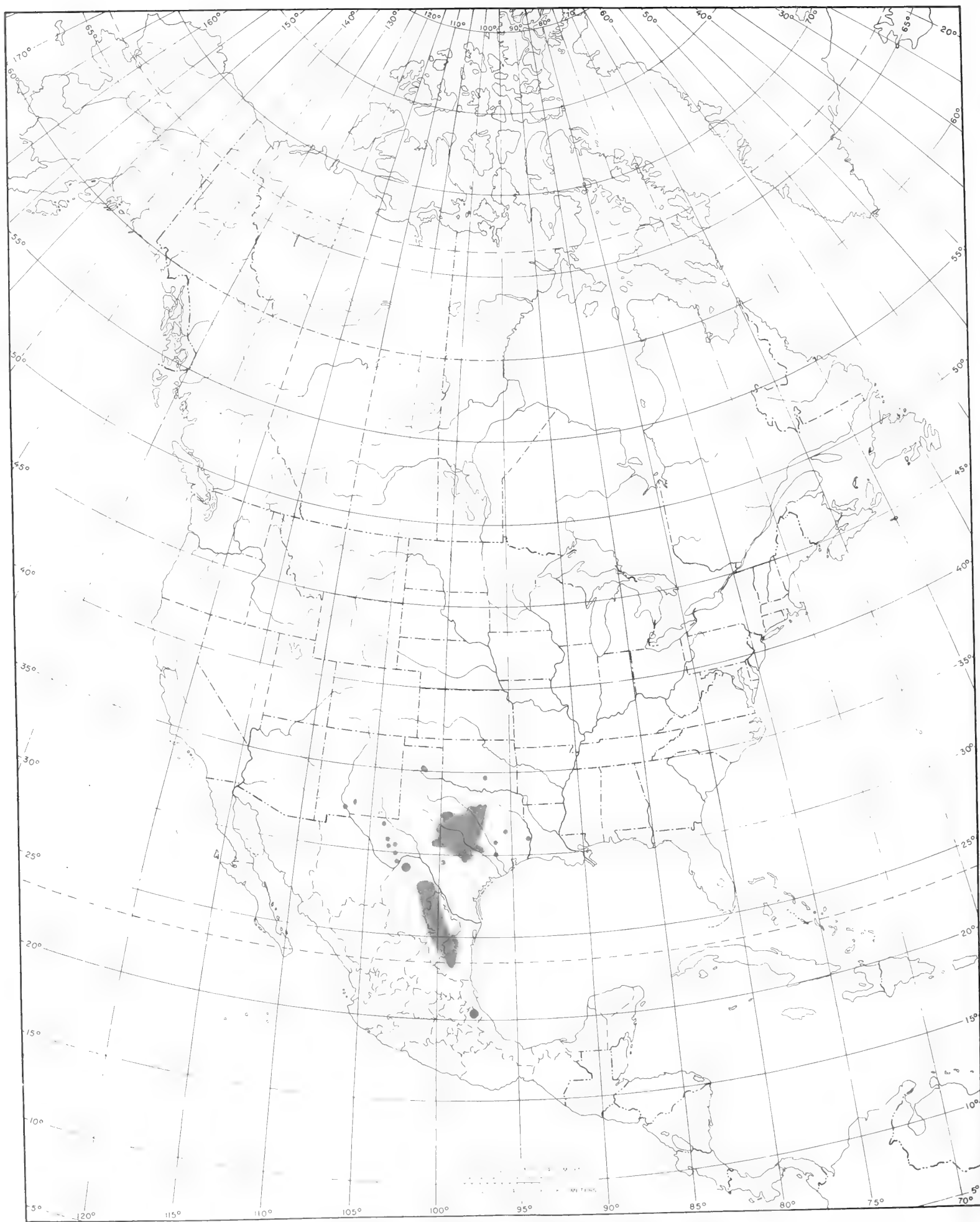
Map 155-SW. *Rhus glabra* L., smooth sumac, southwestern range. Eastern range in Volume 4.



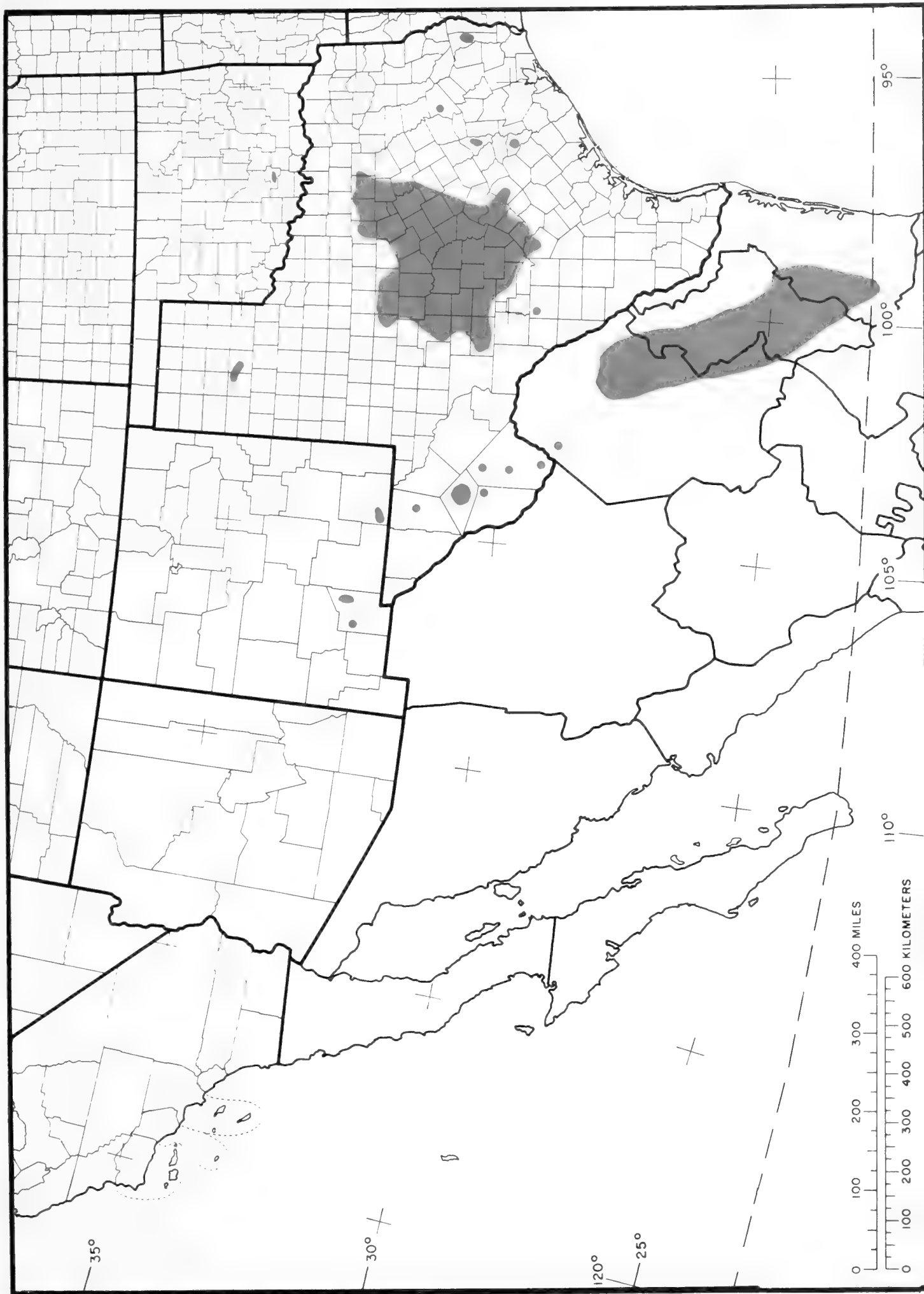
Map 156. *Rhus kearneyi* Barkley, Kearney sumac. Southwestern Arizona and Baja California only.



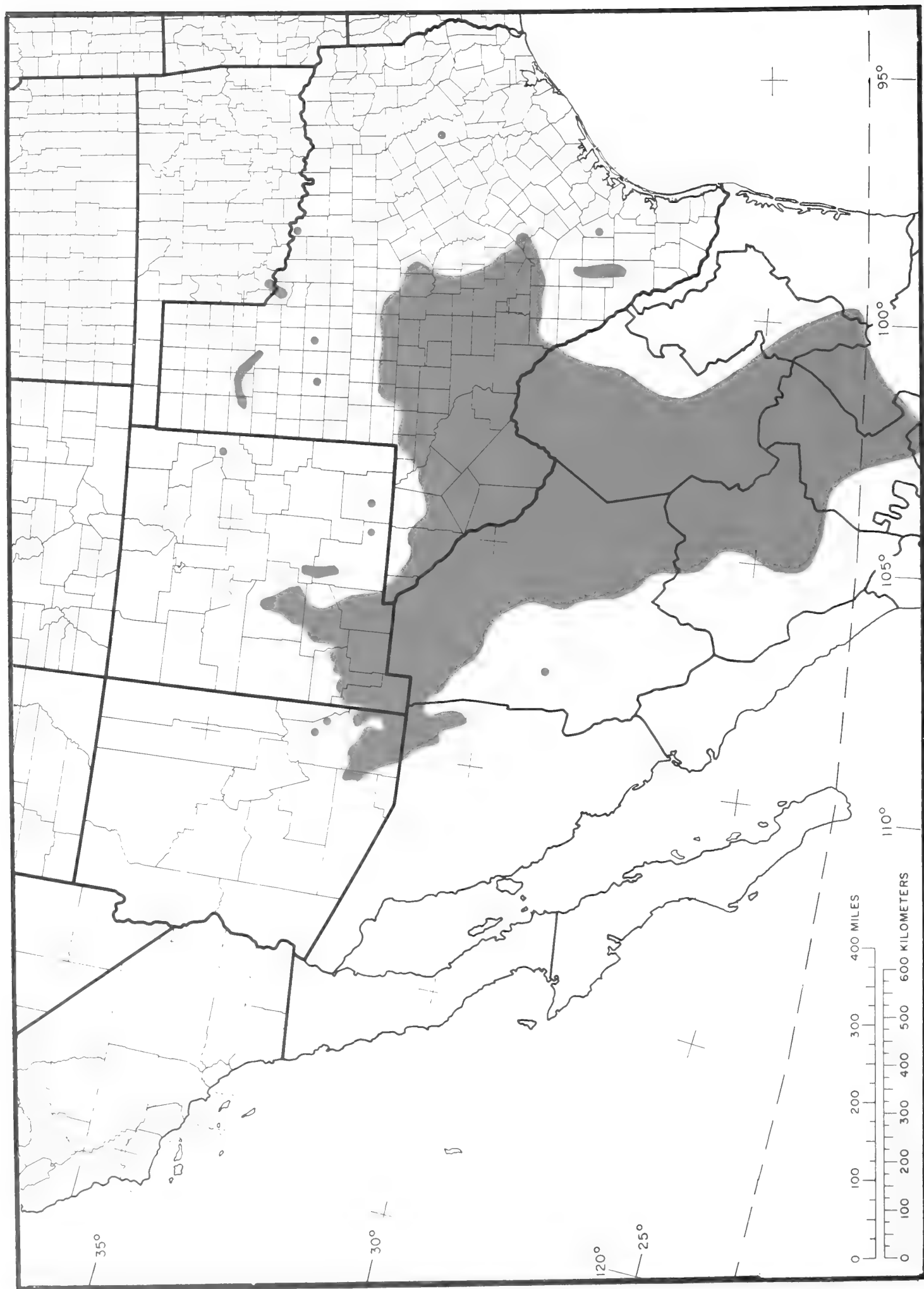
Map 157. *Rhus laurina* Nutt., laurel sumac. Coastal southern California including Santa Catalina and San Clemente Islands and Baja California including Cedros and Guadalupe Islands.



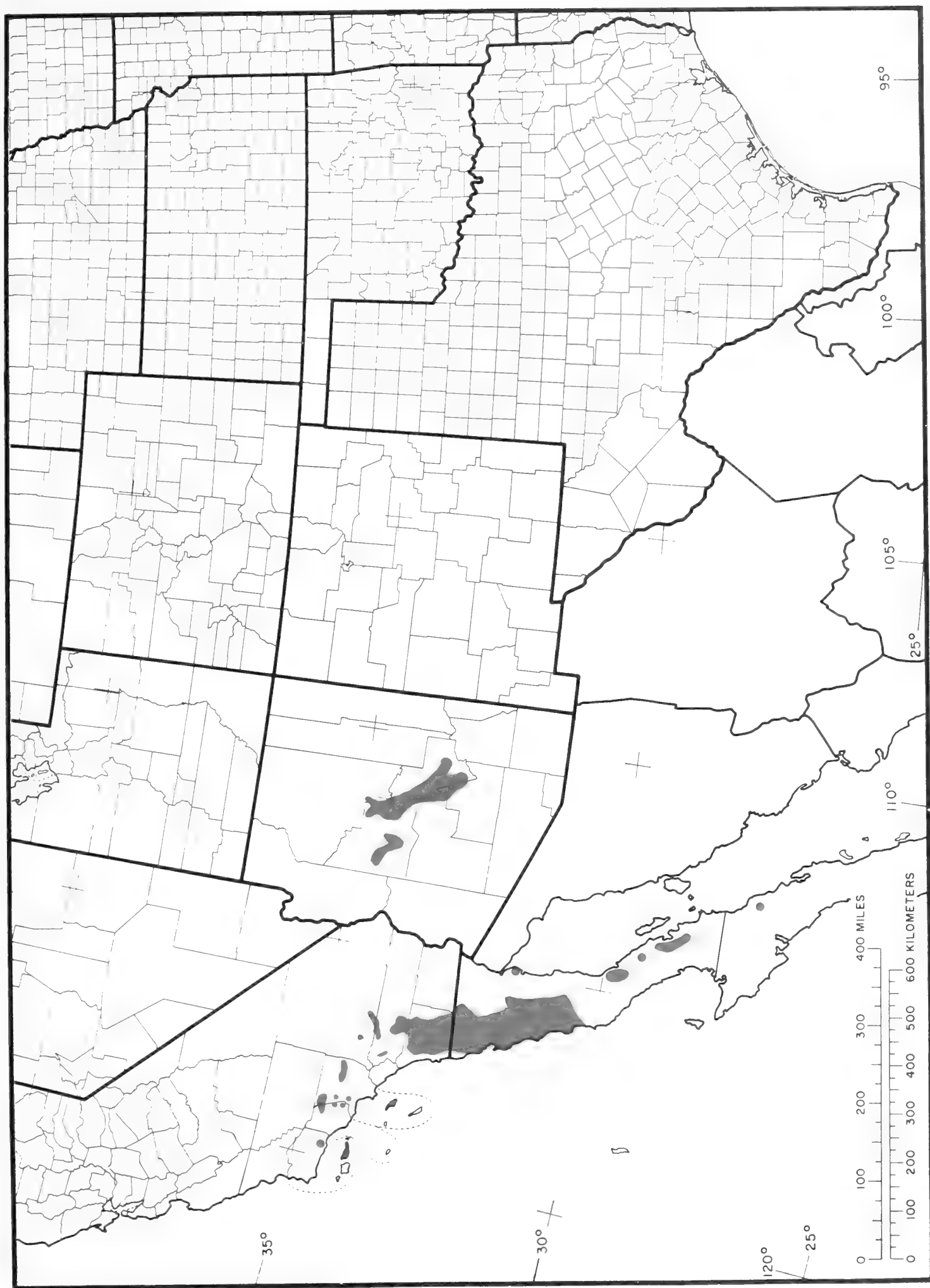
Map 158-*N. Rhus lanceolata* (A. Gray) Britton, prairie sumac.



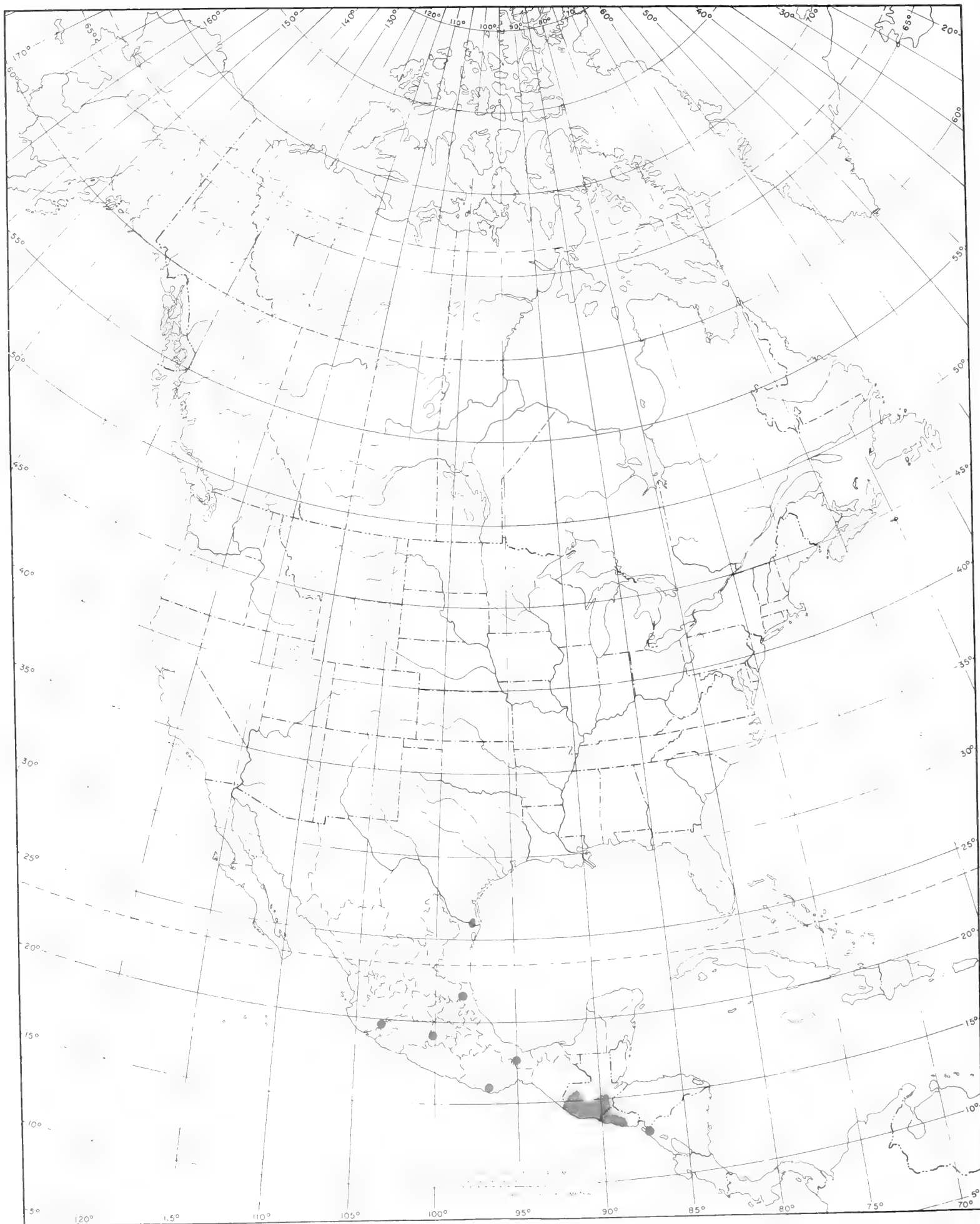
Map 158-SW. *Rhus lanceolata* (A. Gray) Britton, prairie sumac.



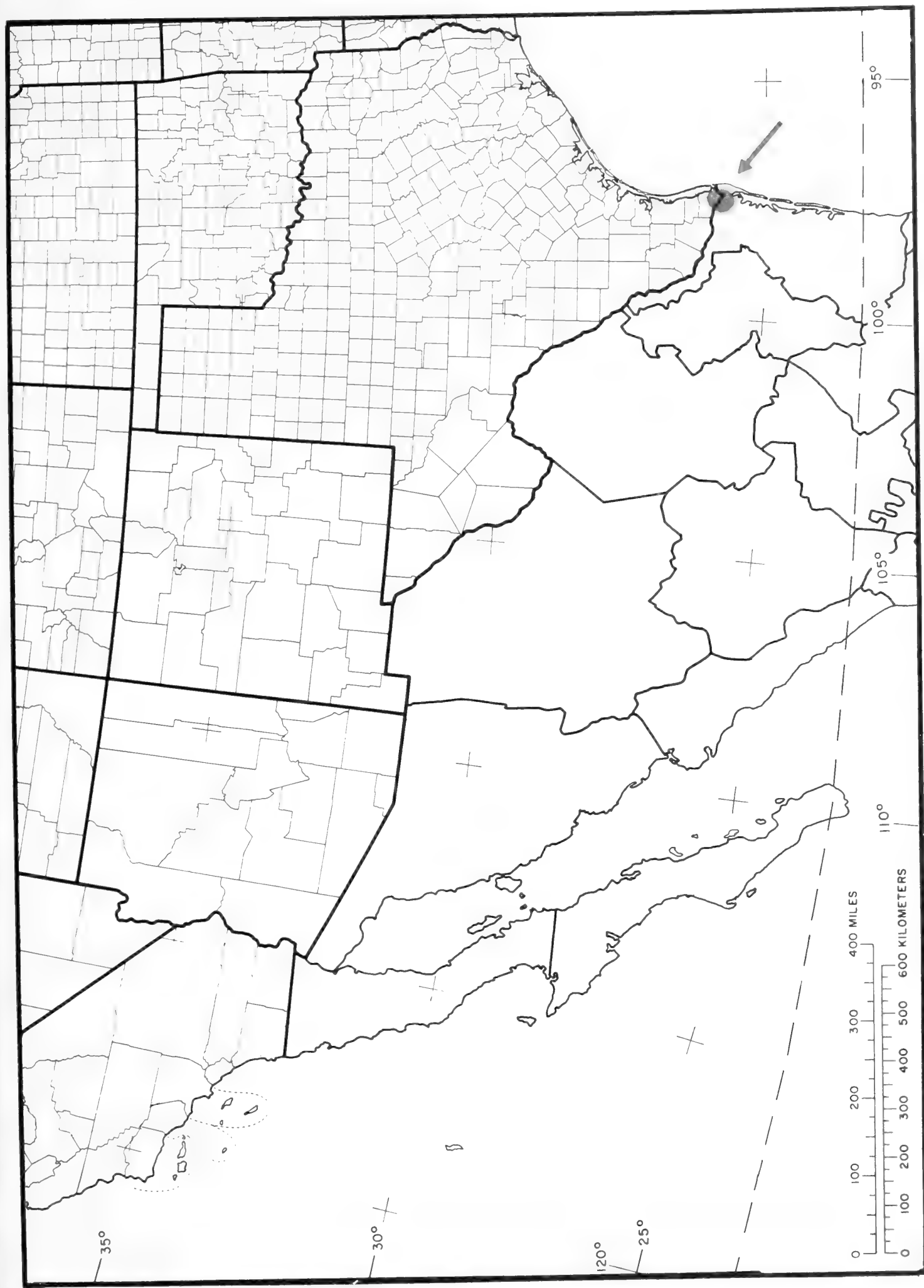
Map 159. *Rhus microphylla* Engelm., littleleaf sumac.



Map 160. *Rhus ovata* S. Wats., sugar sumac.



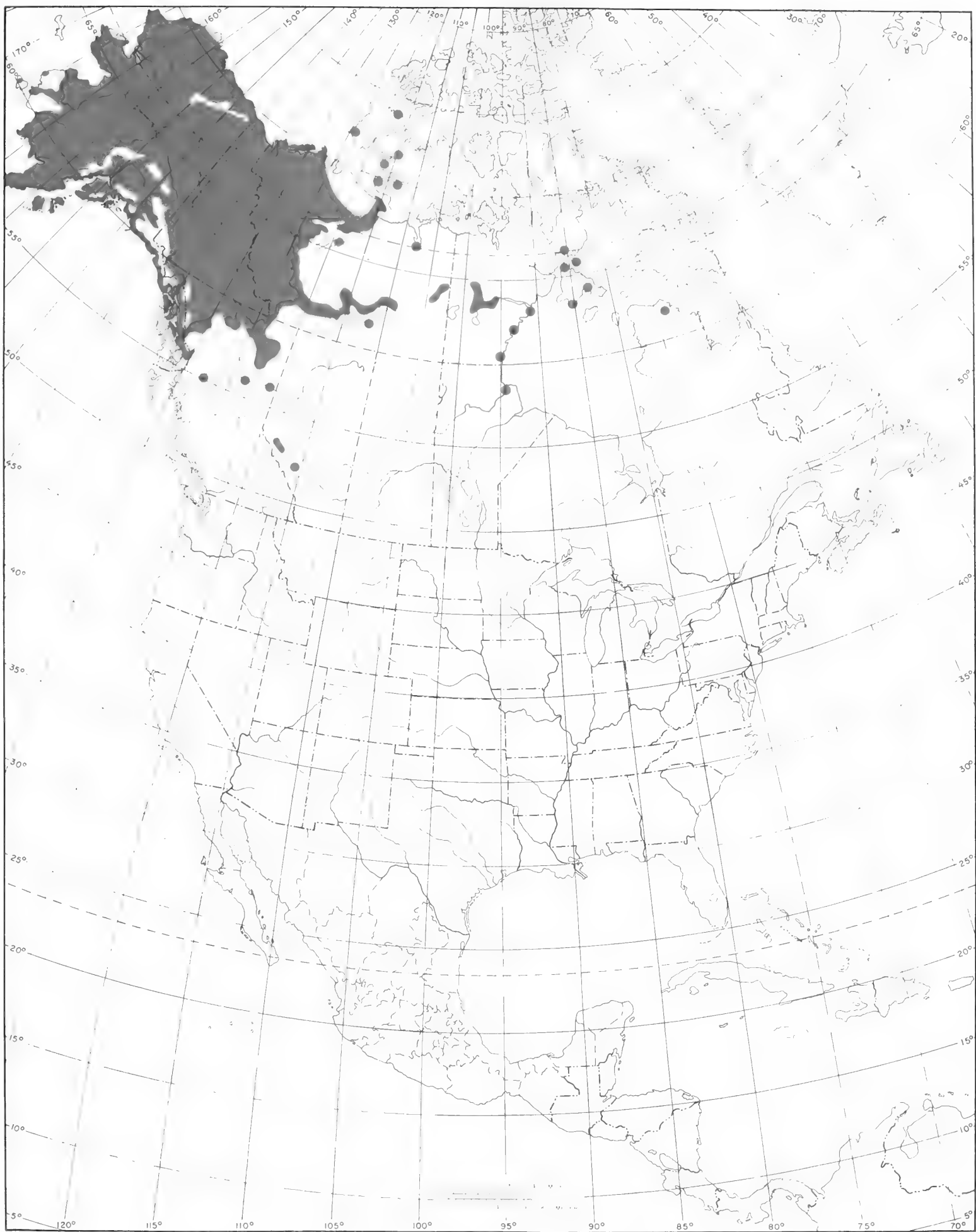
Map 161-N. *Sabal mexicana* Mart.. Mexican palmetto.



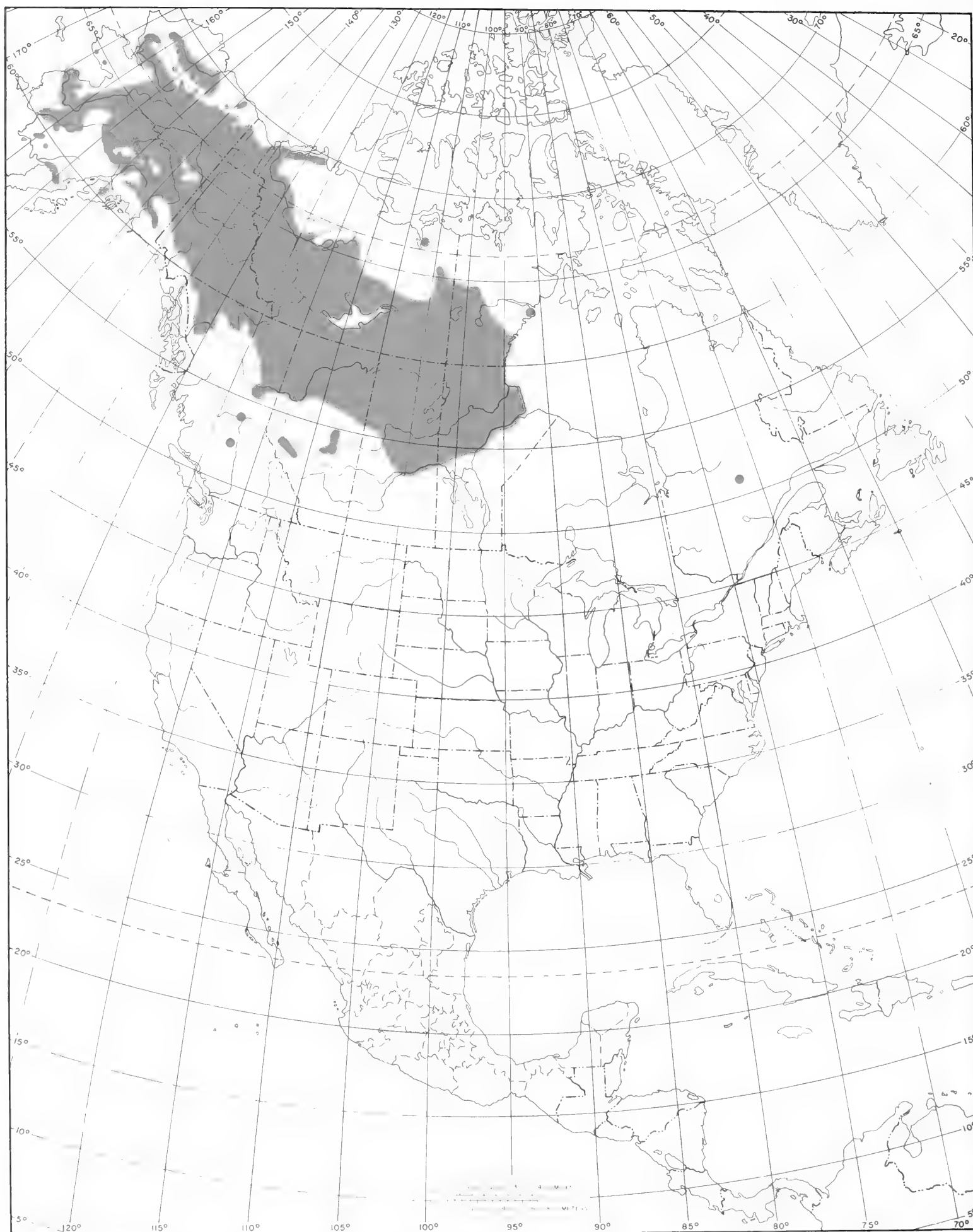
Map 161-SW. *Sabal mexicana* Mart., Mexican palmetto. Extreme southern Texas and Mexico.



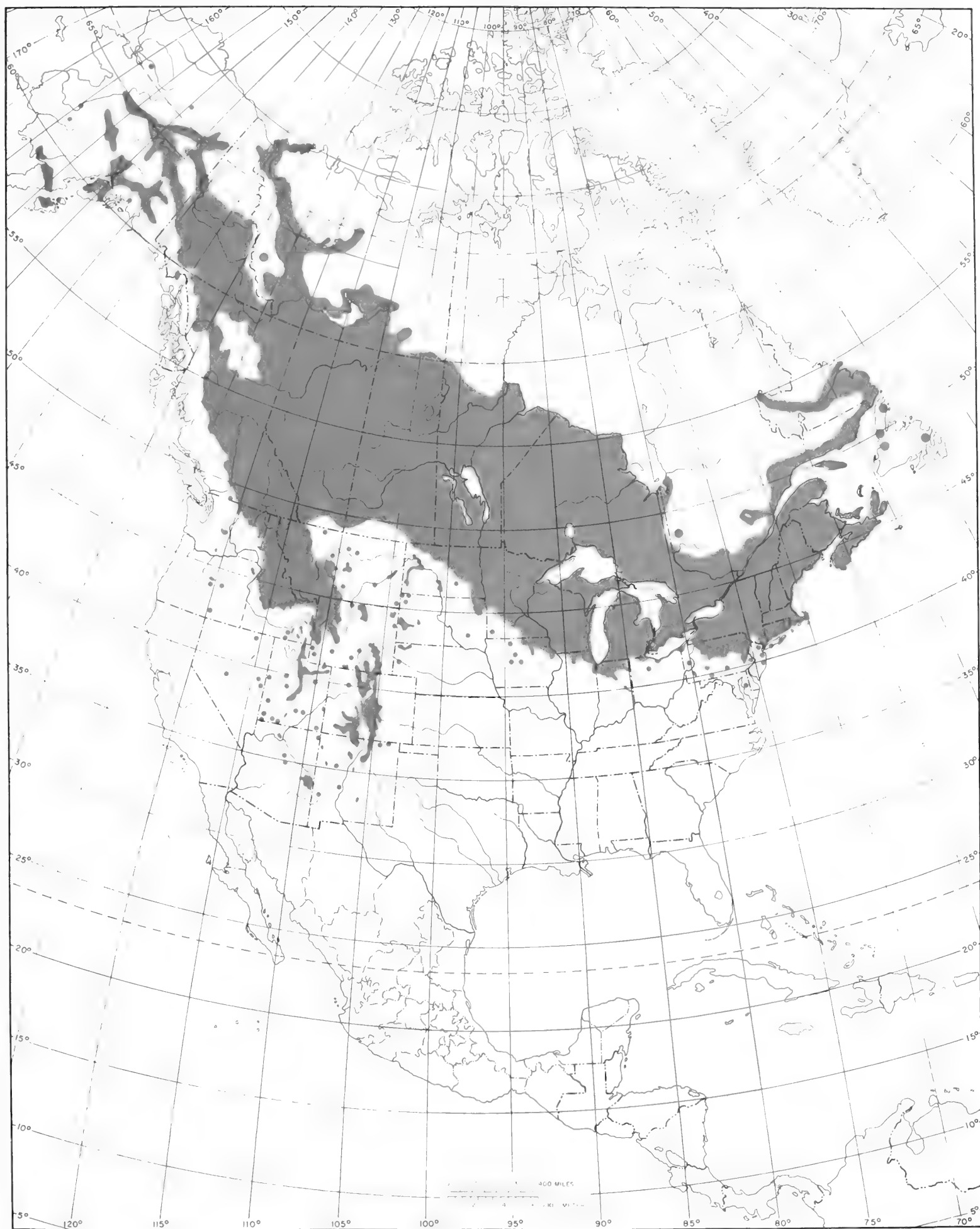
Map 162. *Robinia neomexicana* A. Gray, New Mexican locust.



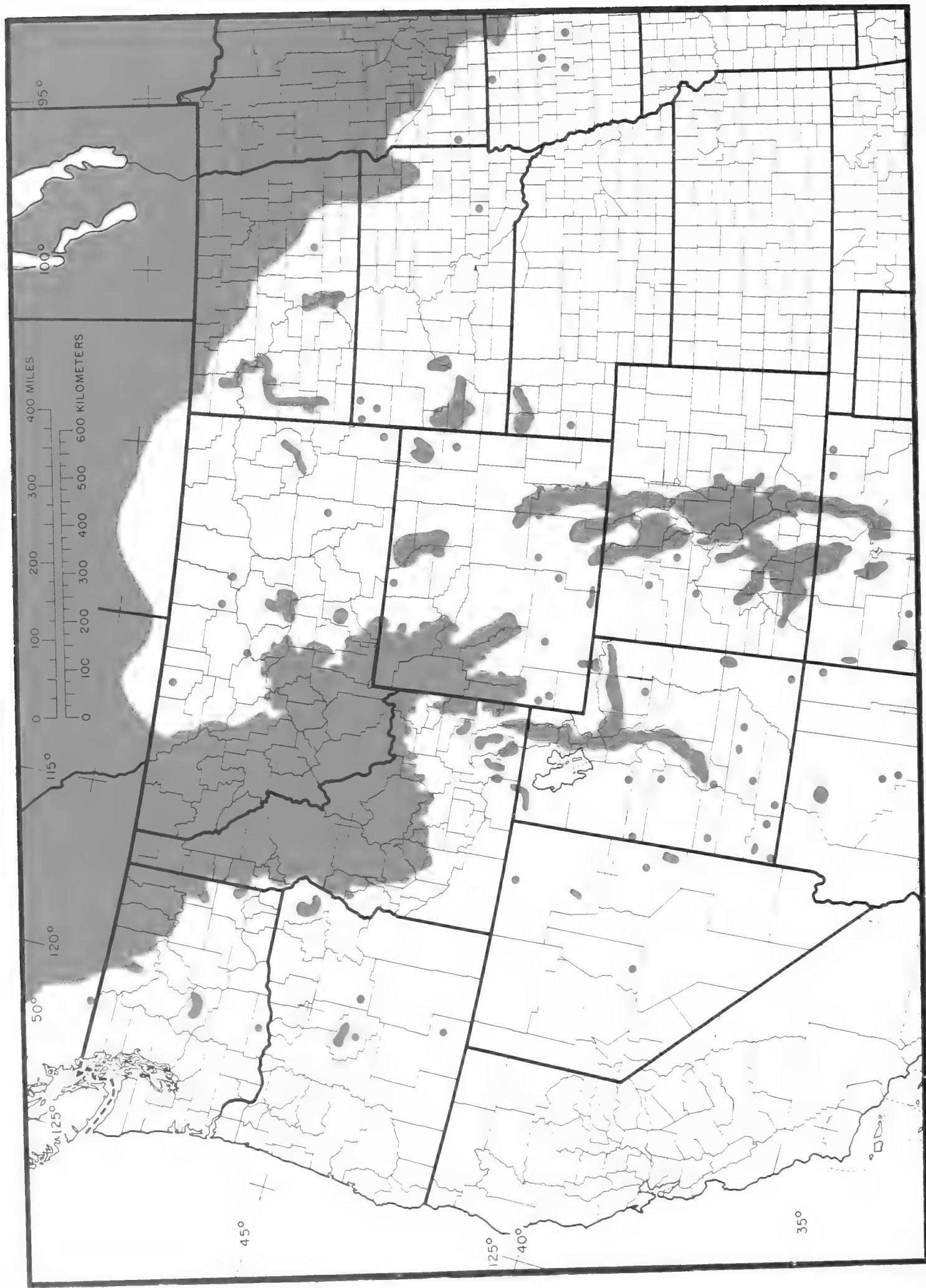
Map 163-N. *Salix alaxensis* (Anderss.) Cov., feltleaf willow. Not in contiguous United States.



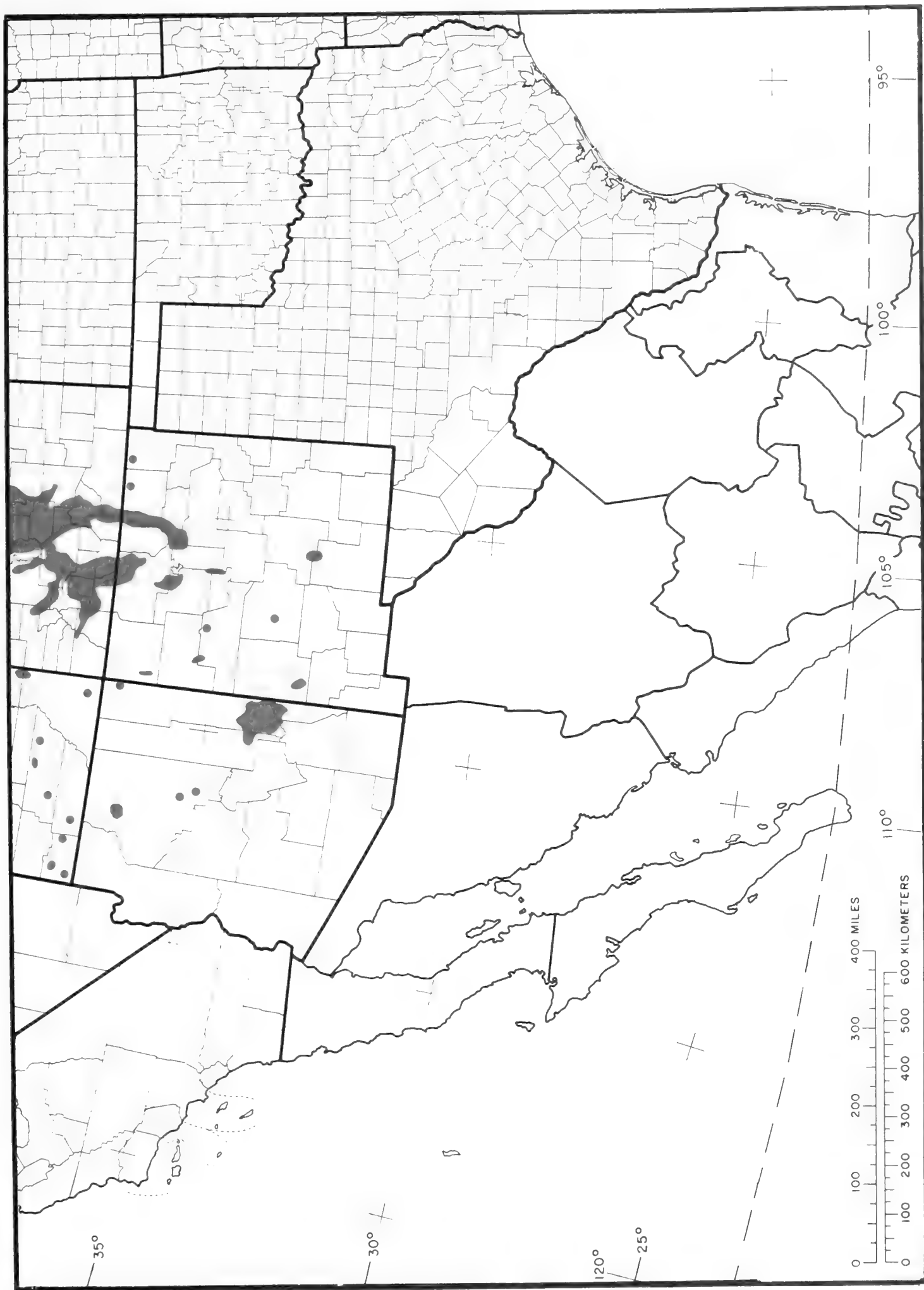
Map 164-N. *Salix arbusculoides* Anderss., peachleaf willow. Not in contiguous United States.



Map 165-N. *Salix bebbiana* Sarg., Bebb willow.



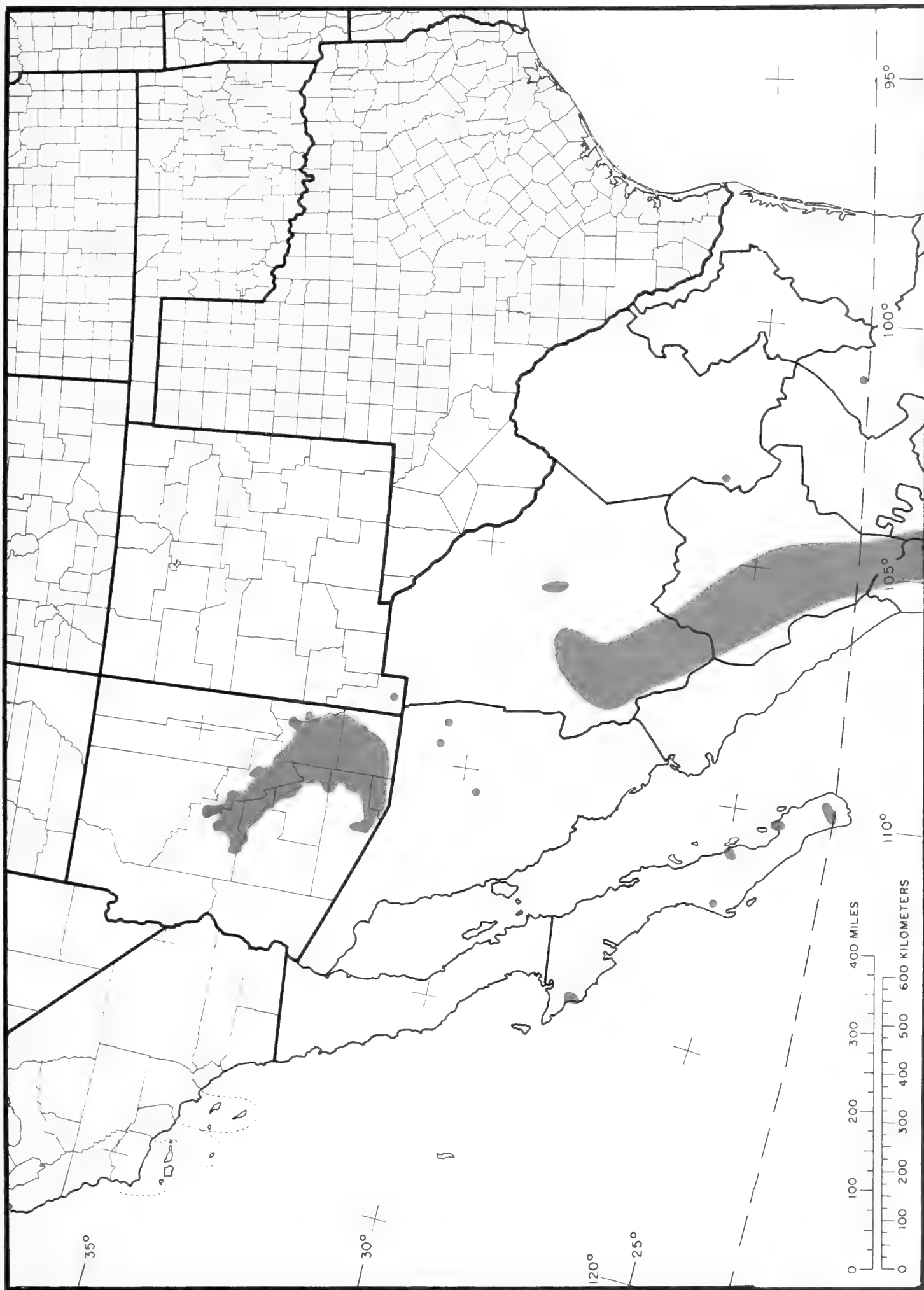
Map 165-NW. *Salix bebbiana* Sarg., Bebb willow, northwestern range. Eastern range in Volume 4.



Map 165-SW. *Salix bebbiana* Sarg., Bebb willow, southwestern range. Eastern range in Volume 4.



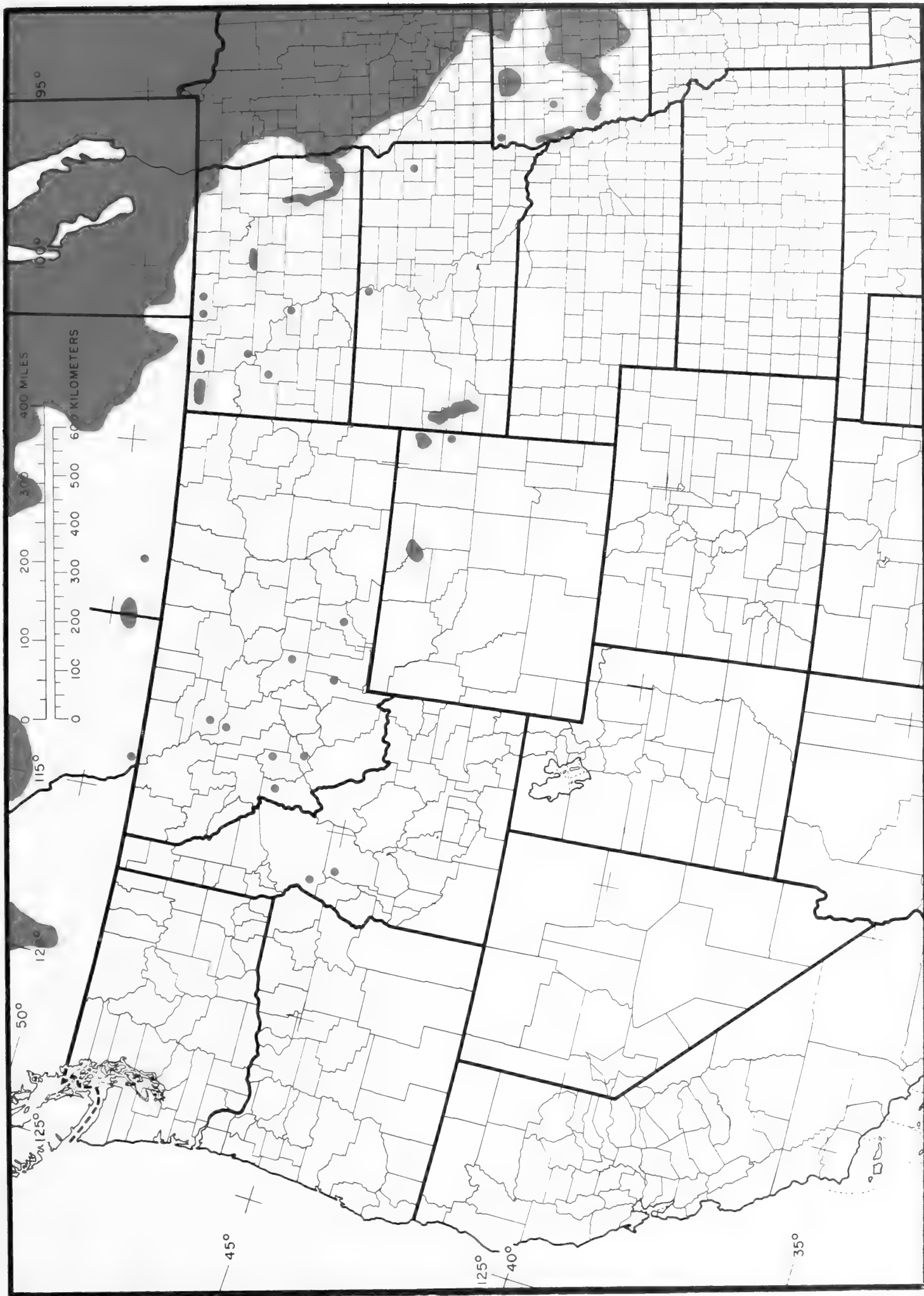
Map 166-N. *Salix bonplandiana* H.B.K., Bonpland willow.



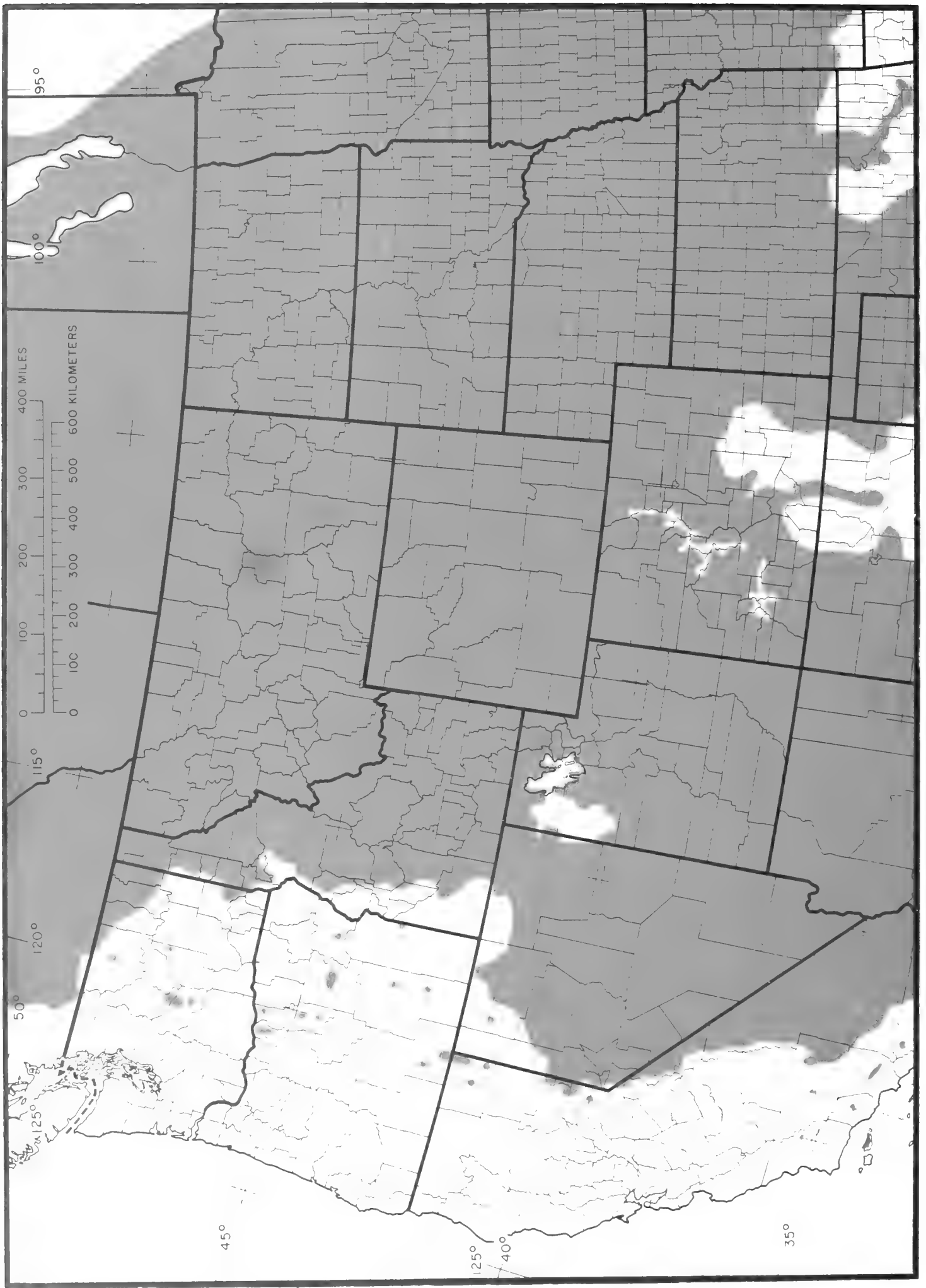
Map 166-SW. *Salix bonplandiana* H.B.K., Bonpland willow. Arizona, extreme southwestern New Mexico, and Mexico.



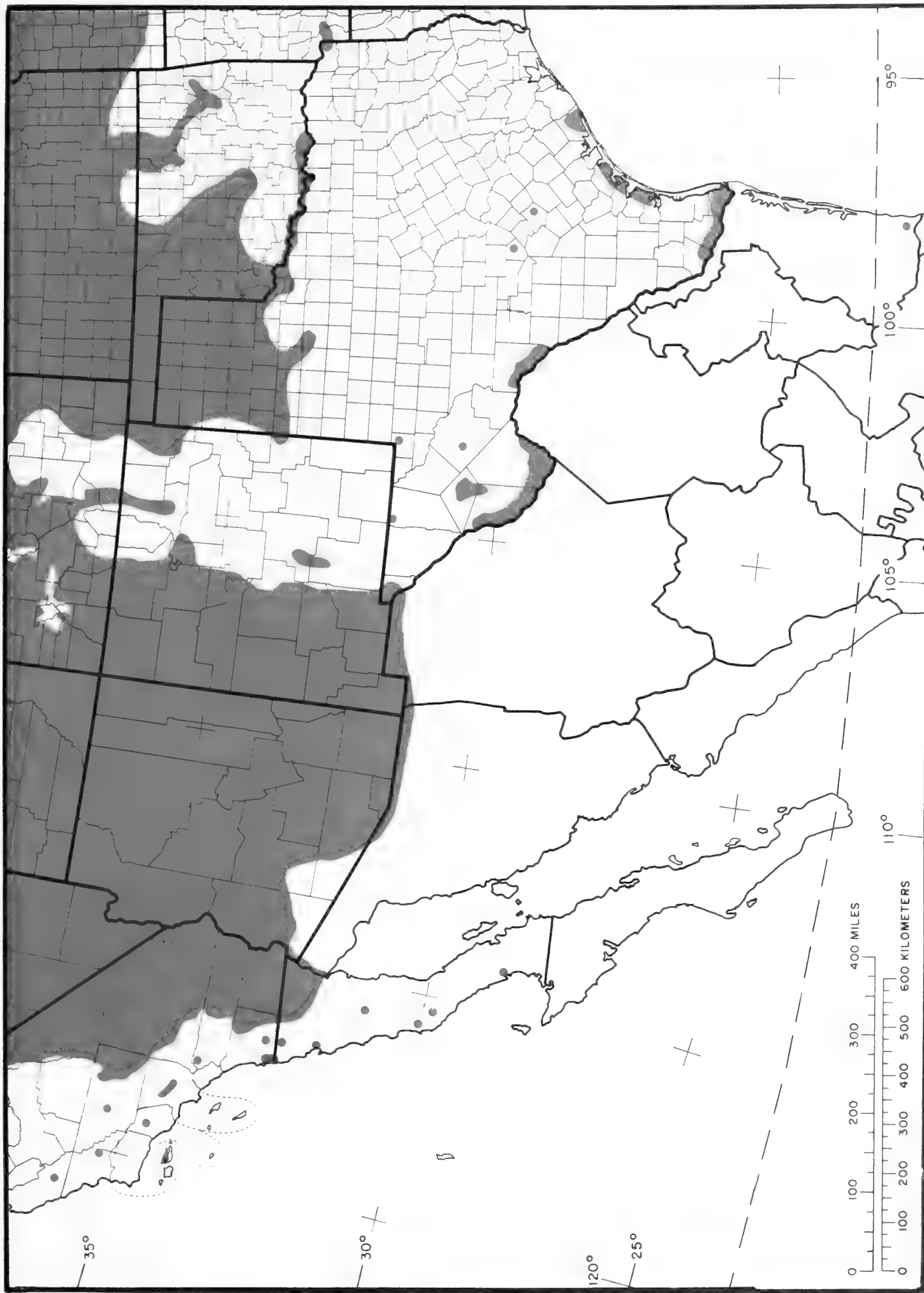
Map 167-N. *Salix discolor* Mühl., pussy willow.



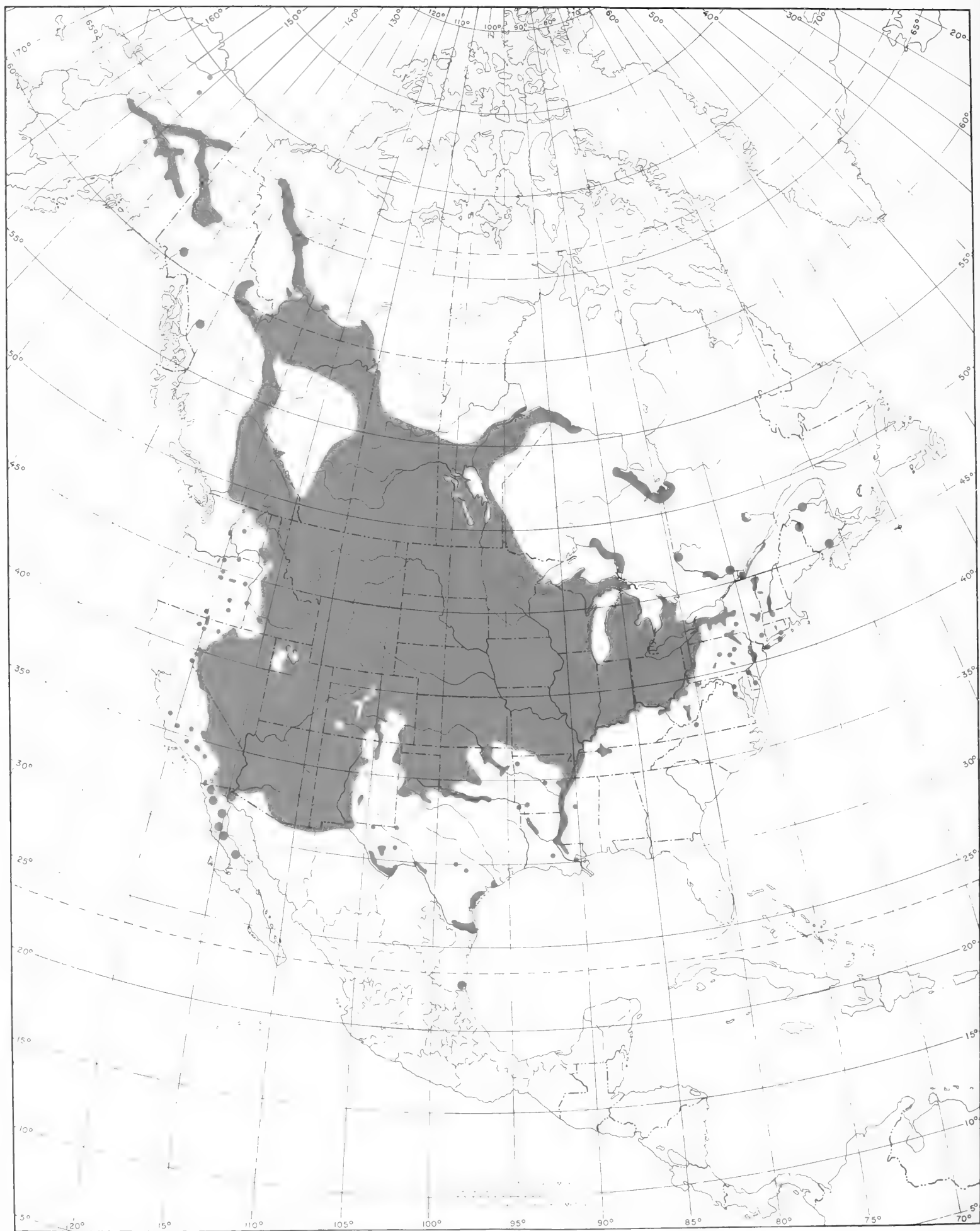
Map 167-W. *Salix discolor* Mühl., pussy willow, western range. Eastern range in Volume 4.



Map 168-NW. *Salix exigua* Nutt., coyote willow, northwestern range. Eastern range in Volume 4.



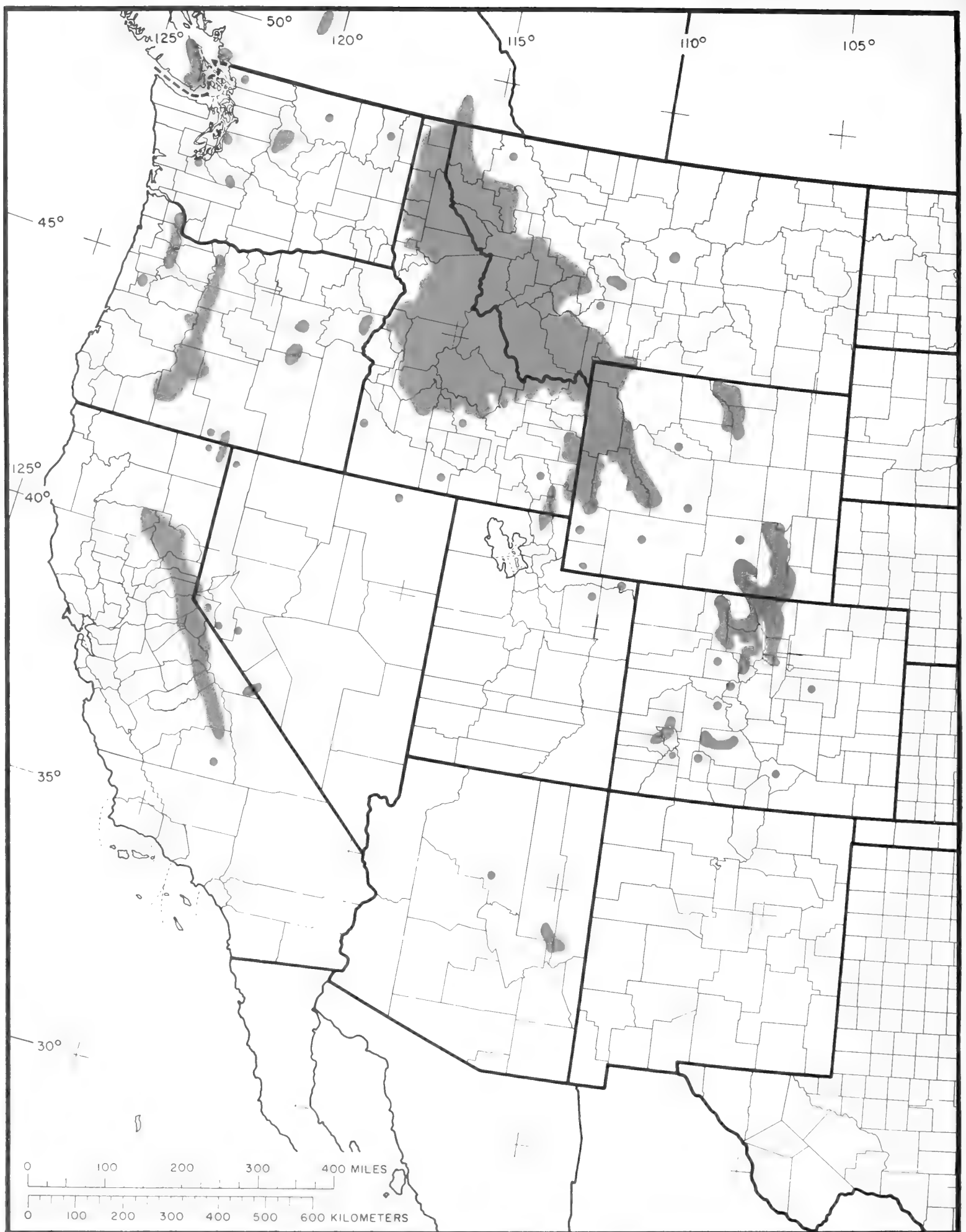
Map 168-SW. *Salix exigua* Nutt., coyote willow, southwestern range. Eastern range in Volume 4.



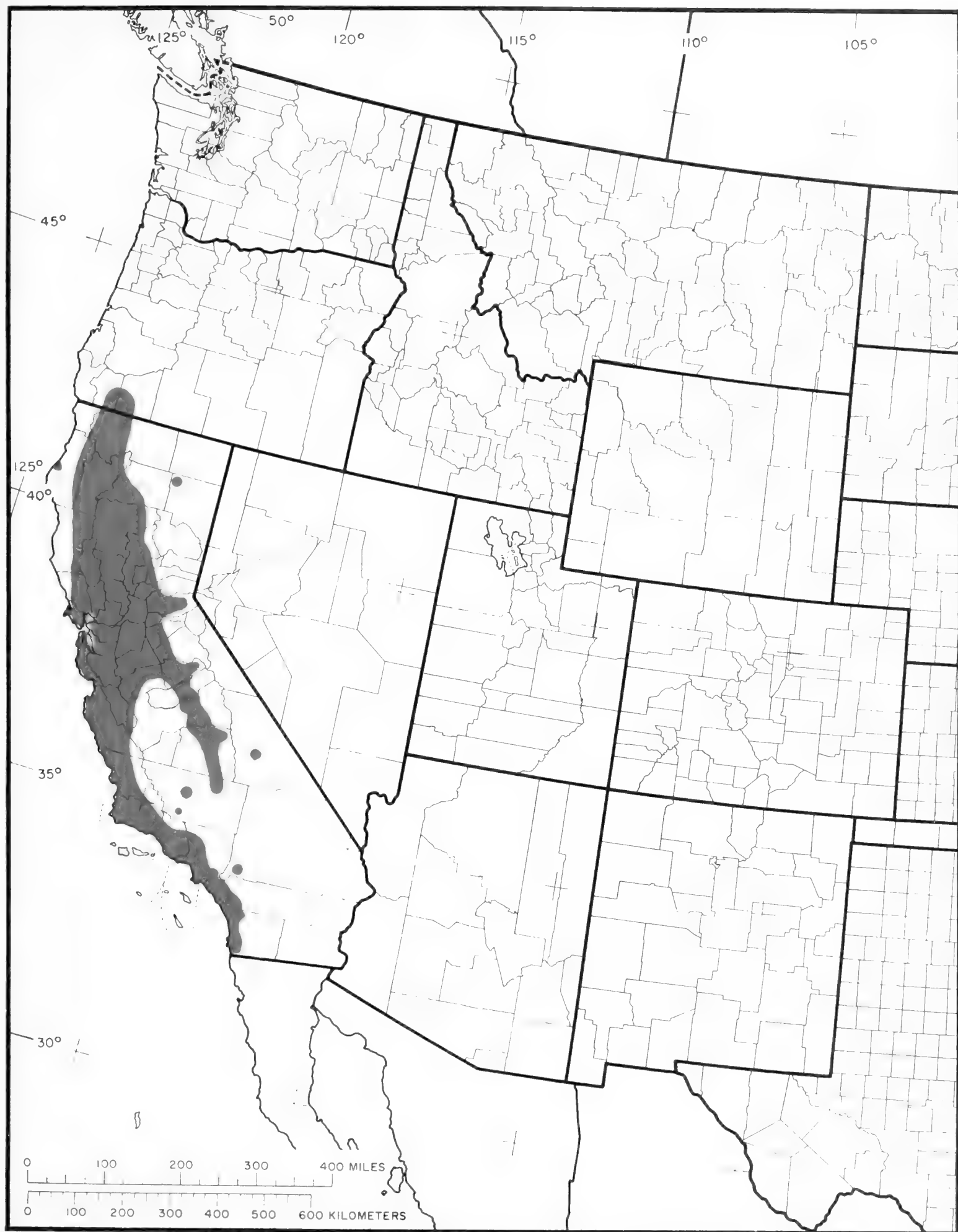
Map 168-N. *Salix exigua* Nutt., coyote willow.



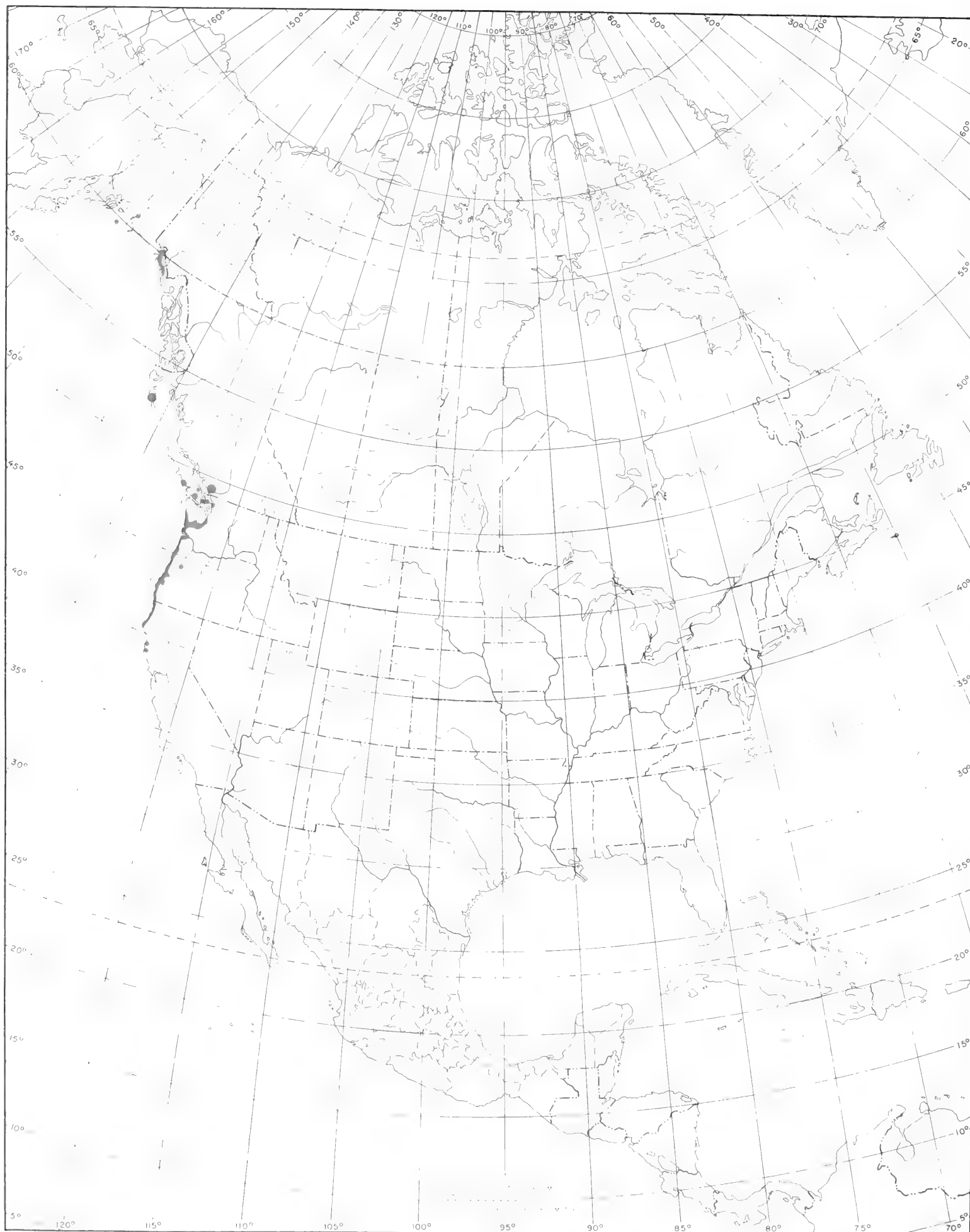
Map 169. *Salix fluviatilis* Nutt., river willow. Southwestern Washington and northwestern Oregon only.



Map 170. *Salix geyeriana* Anderss.. Geyer willow.



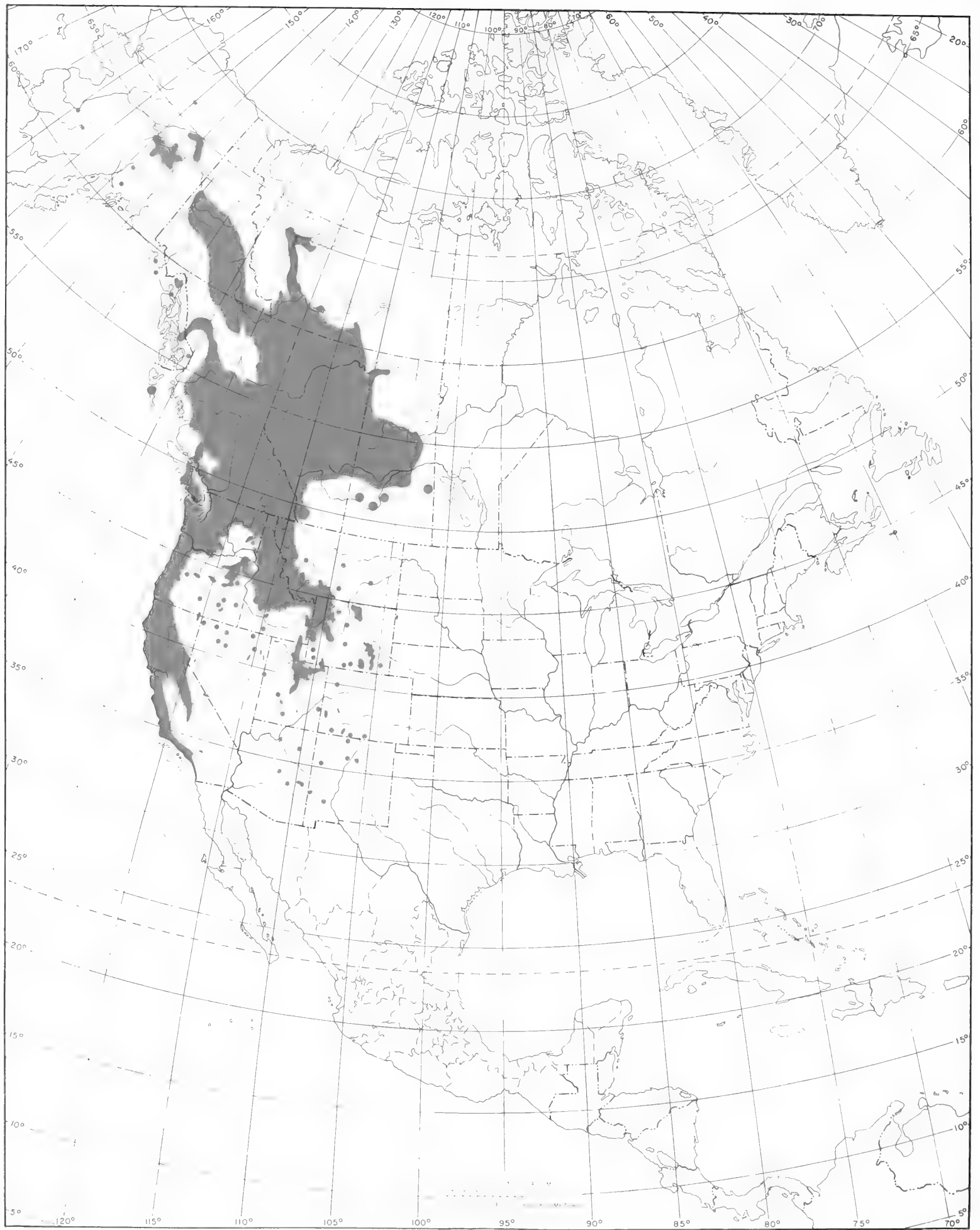
Map 171. *Salix hindsiana* Benth., Hinds willow.



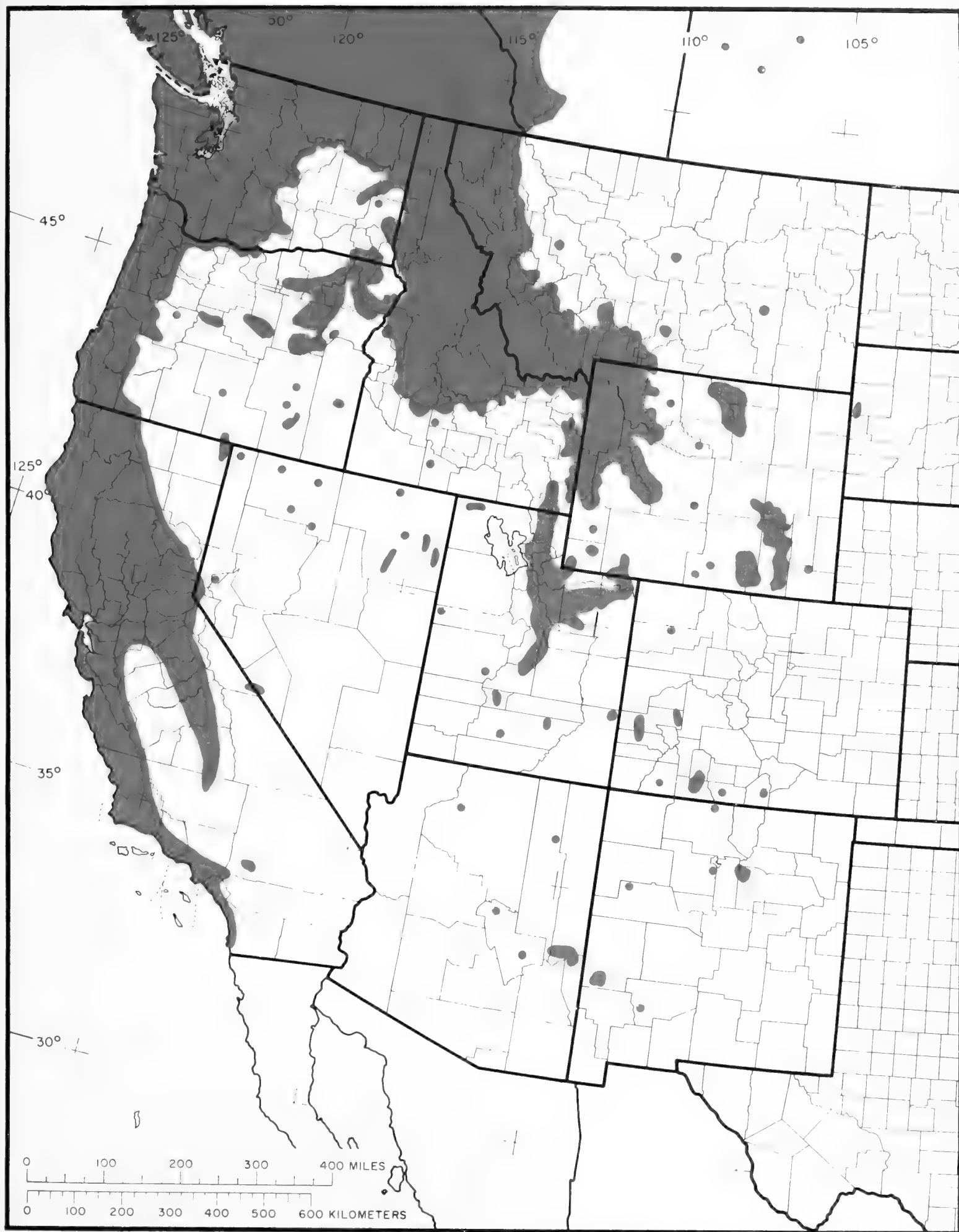
Map 172-N. *Salix hookeriana* Barratt, Hooker willow.



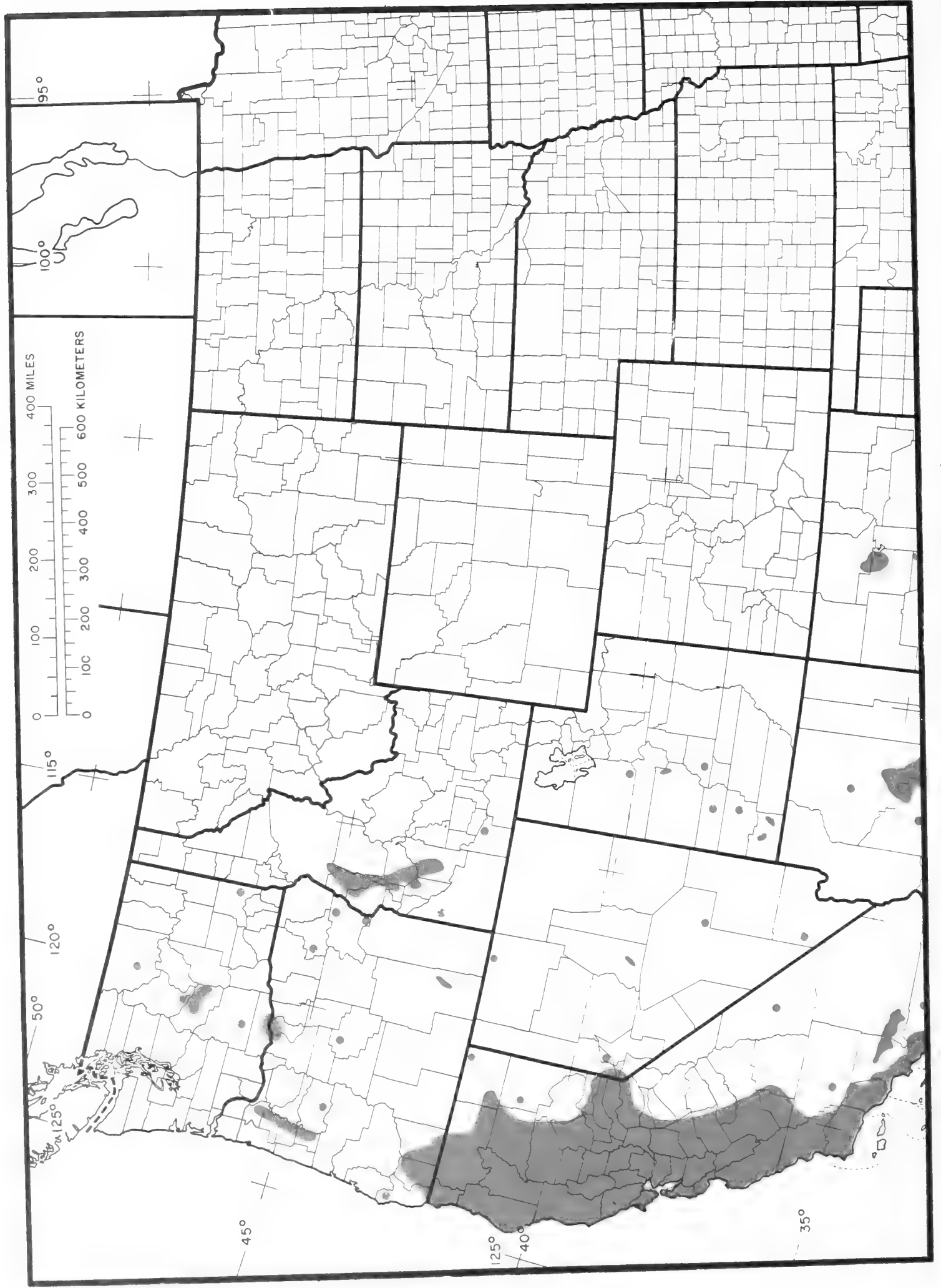
Map 172-W. *Salix hookeriana* Barratt, Hooker willow.



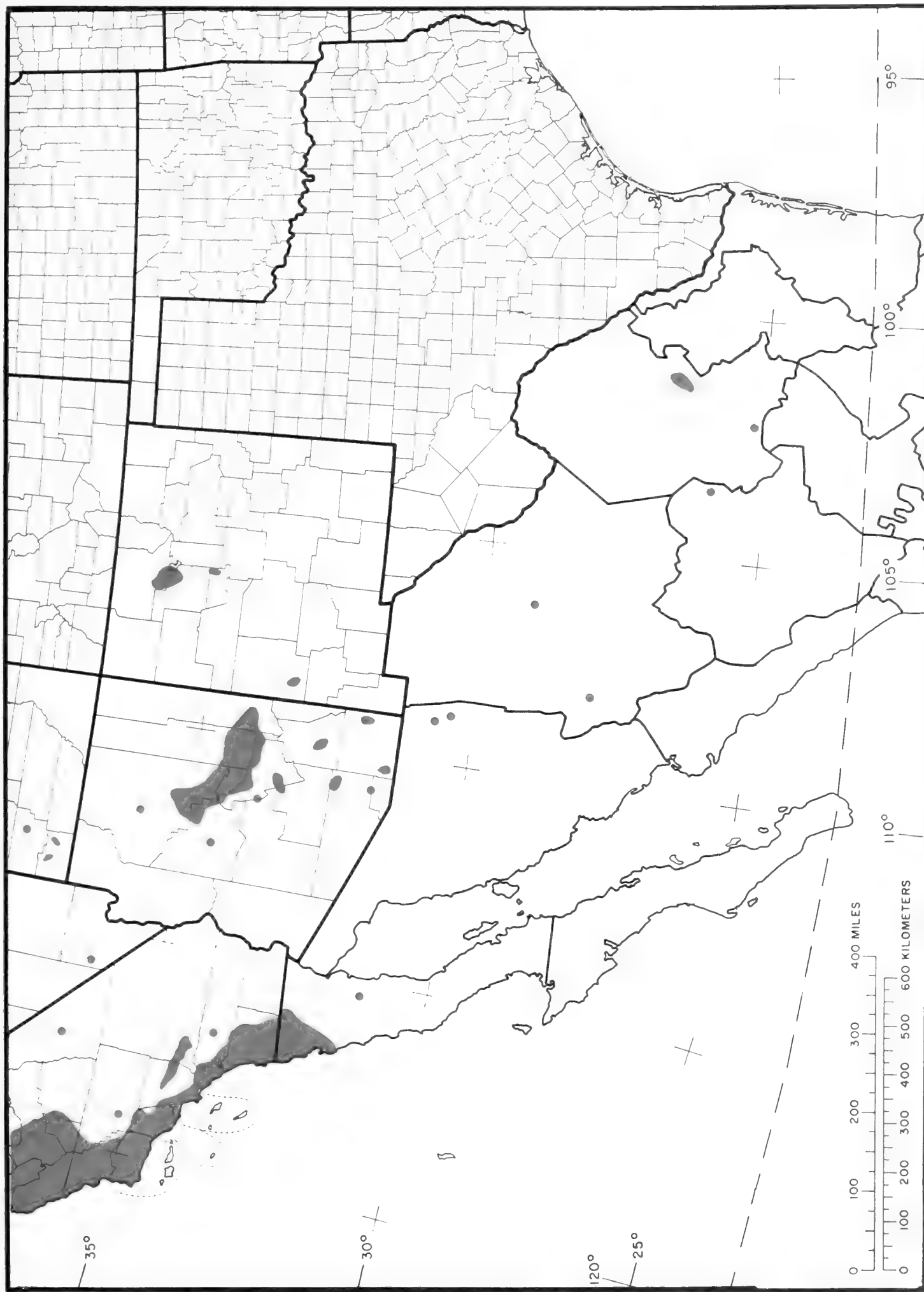
Map 173-N. *Salix lasiandra* Benth., Pacific willow.



Map 173-W. *Salix lasiandra* Benth., Pacific willow.



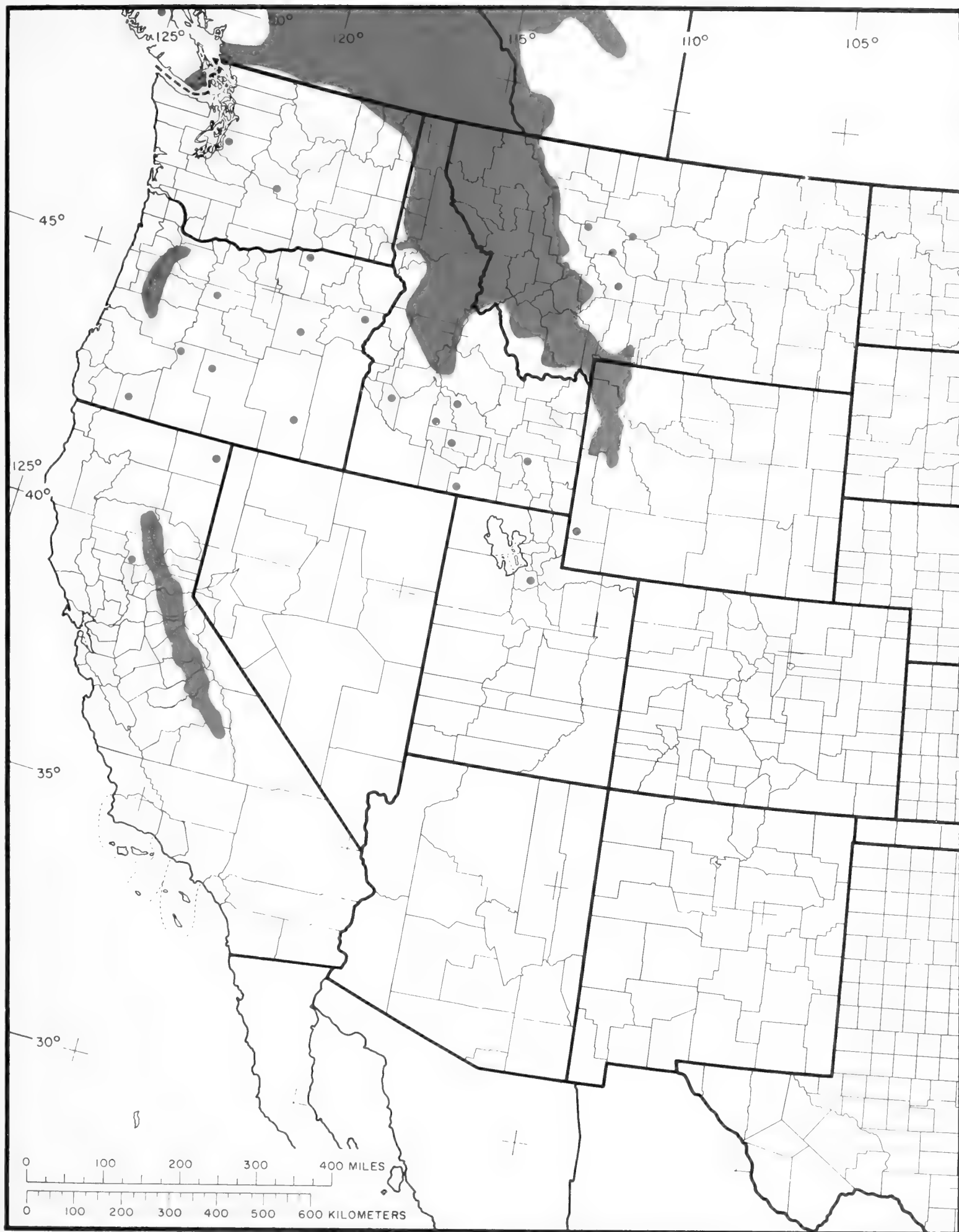
Map 174-NW. *Salix lasiolepis* Benth., arroyo willow, northern range.



Map 174-SW. *Salix lasiolepis* Benth., arroyo willow, southern range.



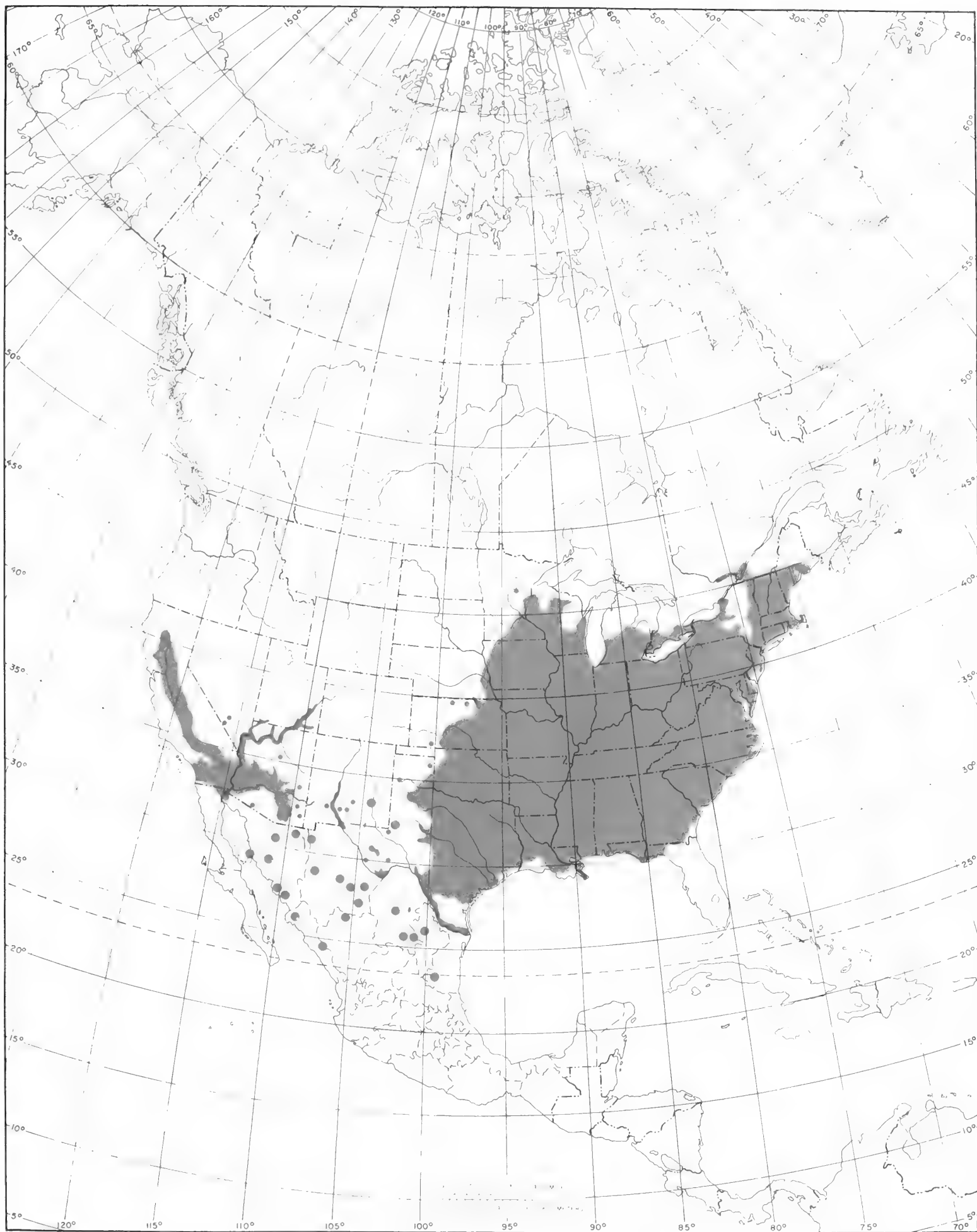
Map 175-N. *Salix mackenziana* (Hook.) Barratt, Mackenzie willow.



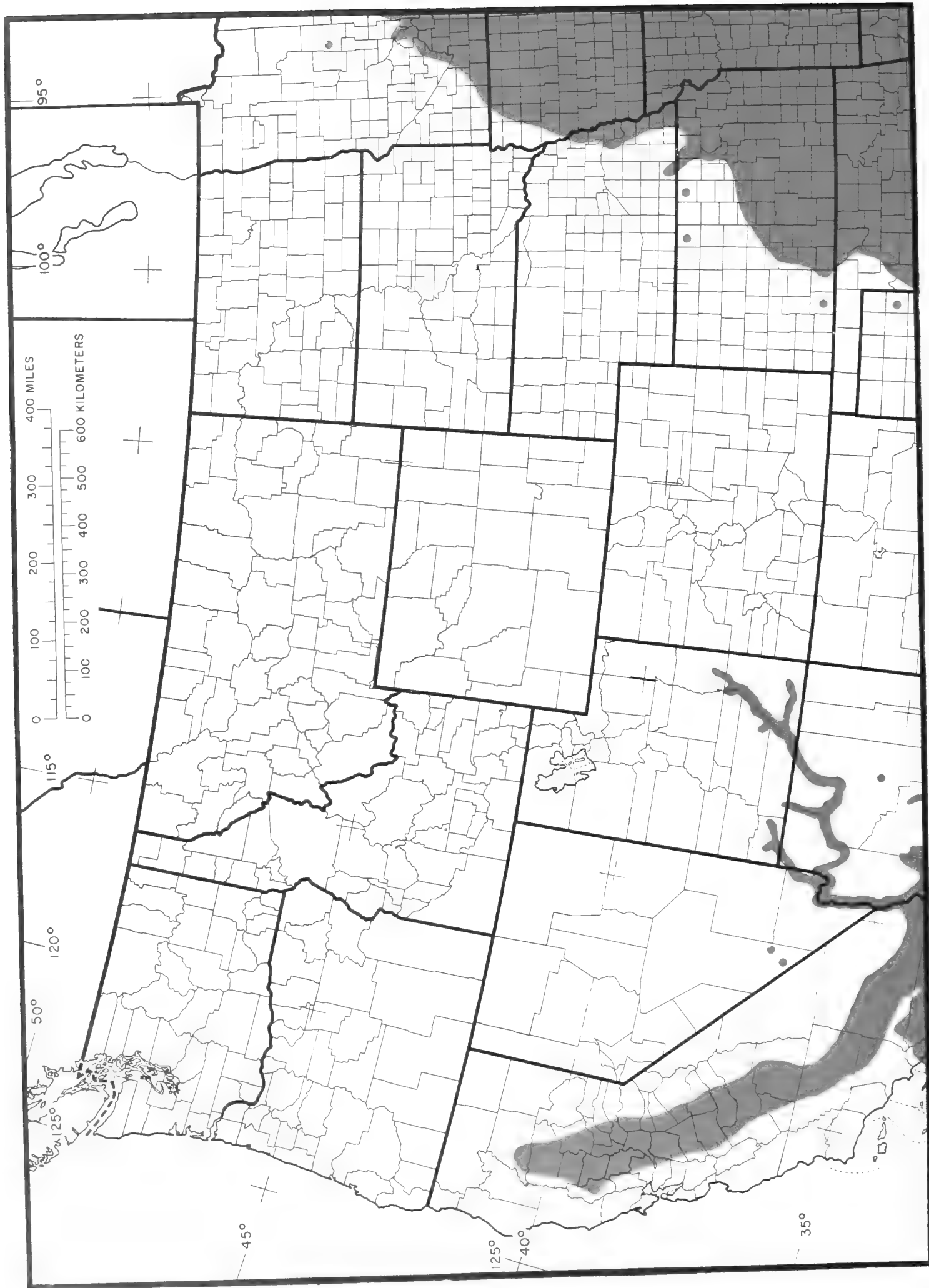
Map 175-W. *Salix mackenziana* (Hook.) Barratt, Mackenzie willow.



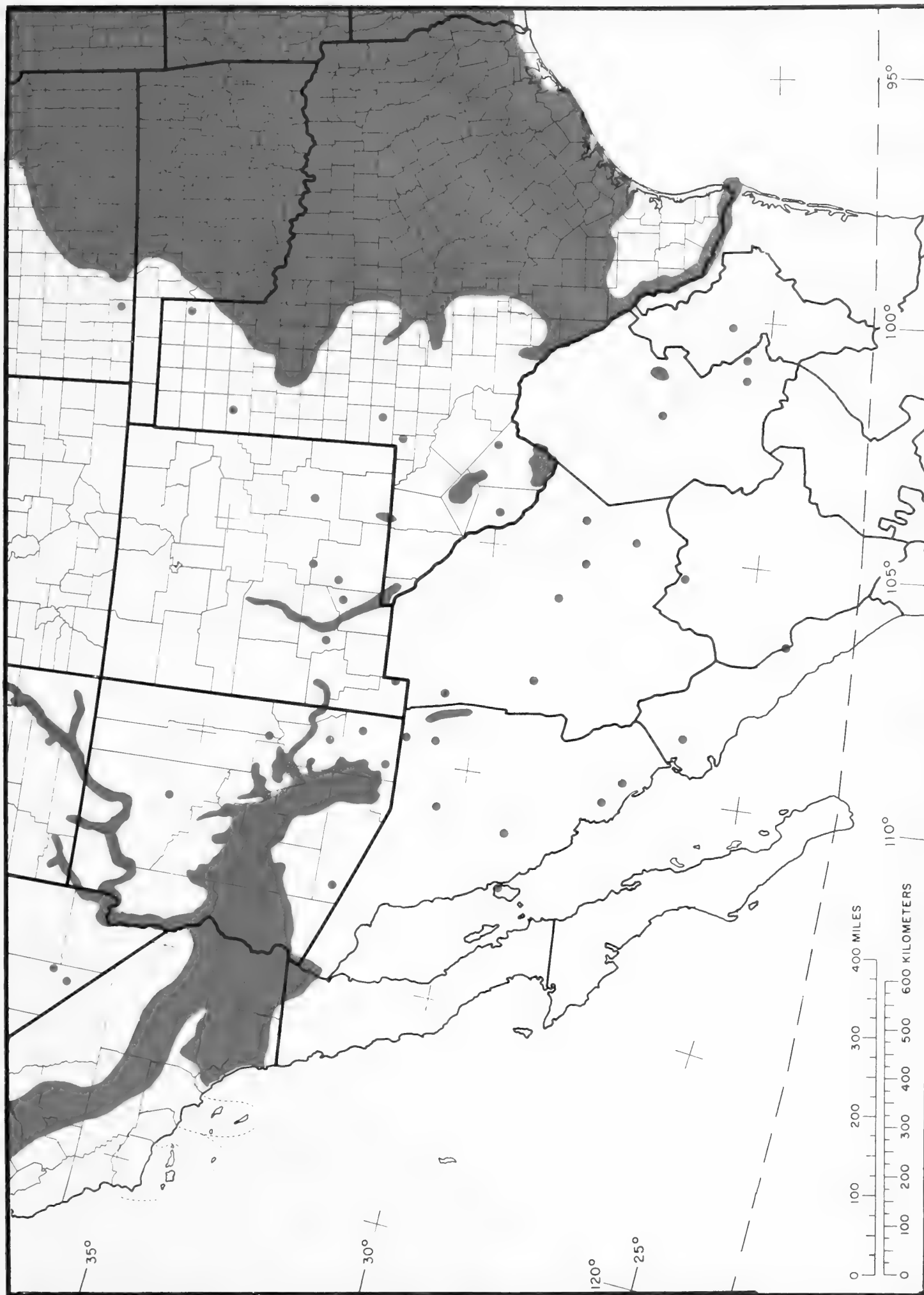
Map 176. *Salix laevigata* Bebb, red willow.



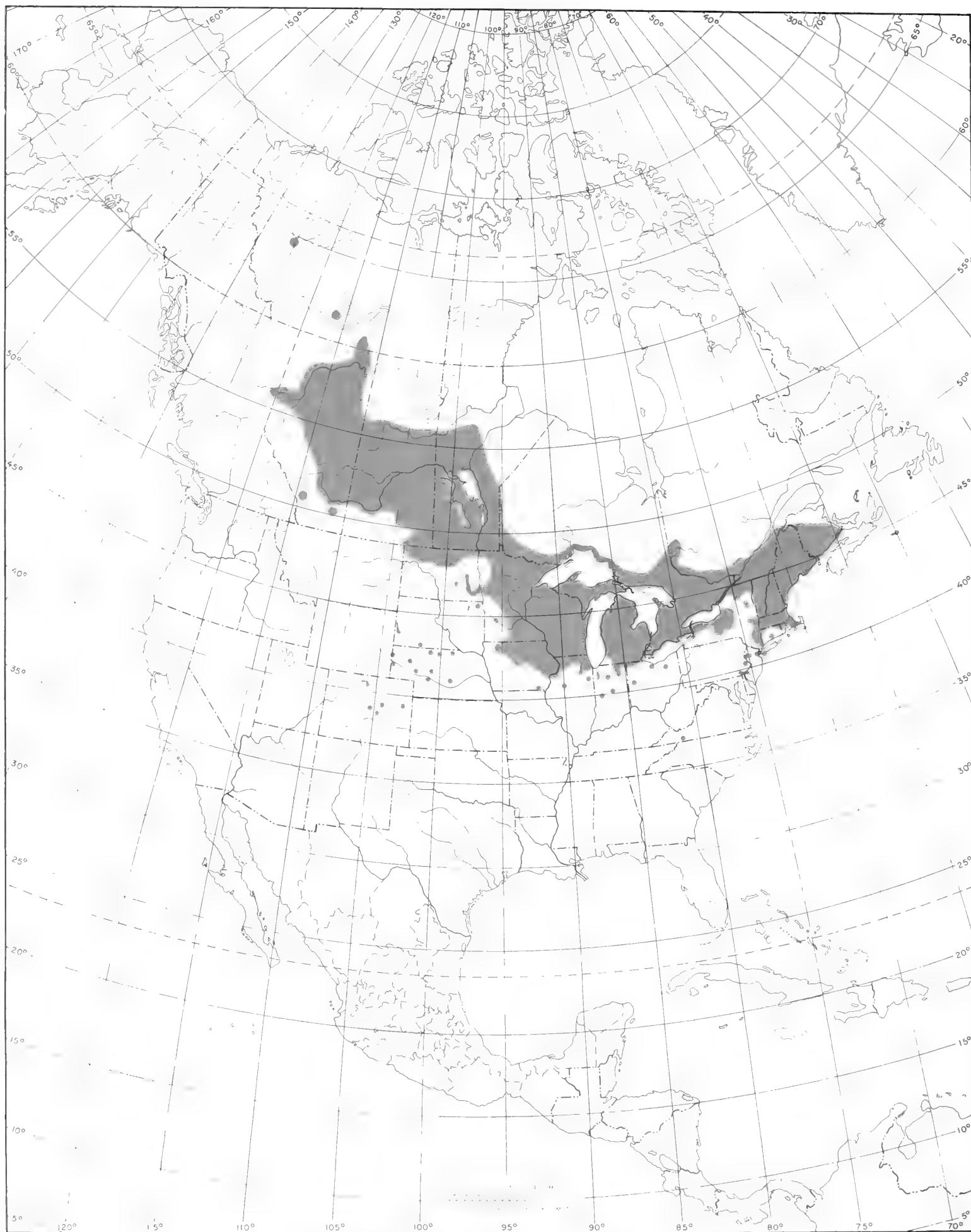
Map 177-*N. Salix nigra* Marsh., black willow.



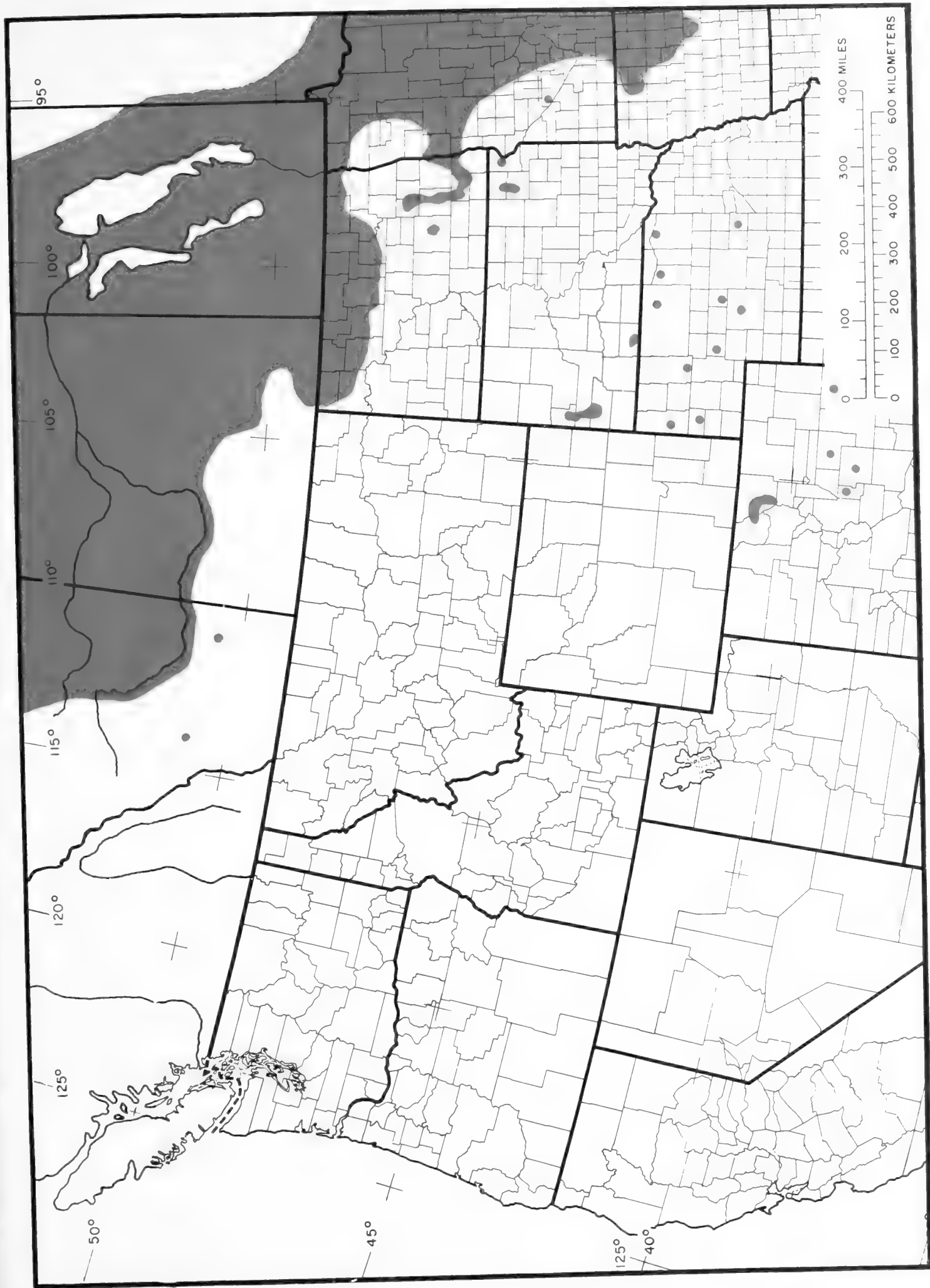
Map 177-NW. *Salix nigra* Marsh., black willow, northwestern range. Eastern range in Volume I.



Map 177-SW. *Salix nigra* Marsh., black willow, southwestern range. Eastern range in Volume I.



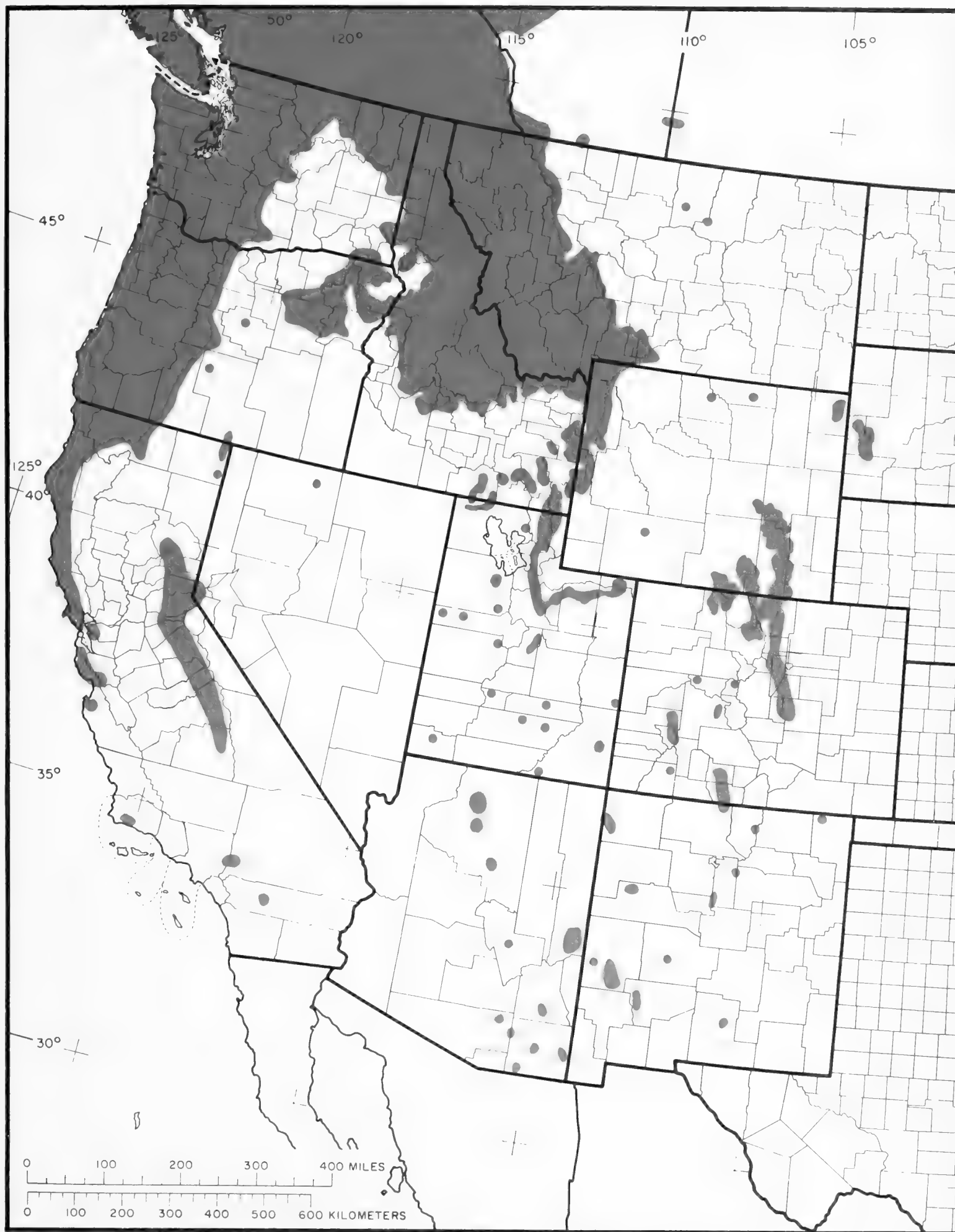
Map 178-N. *Salix petiolaris* J. E. Sm., meadow willow.



Map 178-NW. *Salix petiolaris* J. E. Sm., meadow willow. Eastern range in Volume 4.



Map 179-N. *Salix scouleriana* Barratt, Scouler willow.



Map 179-W. *Salix scouleriana* Barratt. Scouler willow.



Map 180. *Salix sessilifolia* Nutt., northwest willow.



Map 181. *Salix tracyi* Ball. Tracy willow. Extreme southwestern Oregon and northwestern California only.



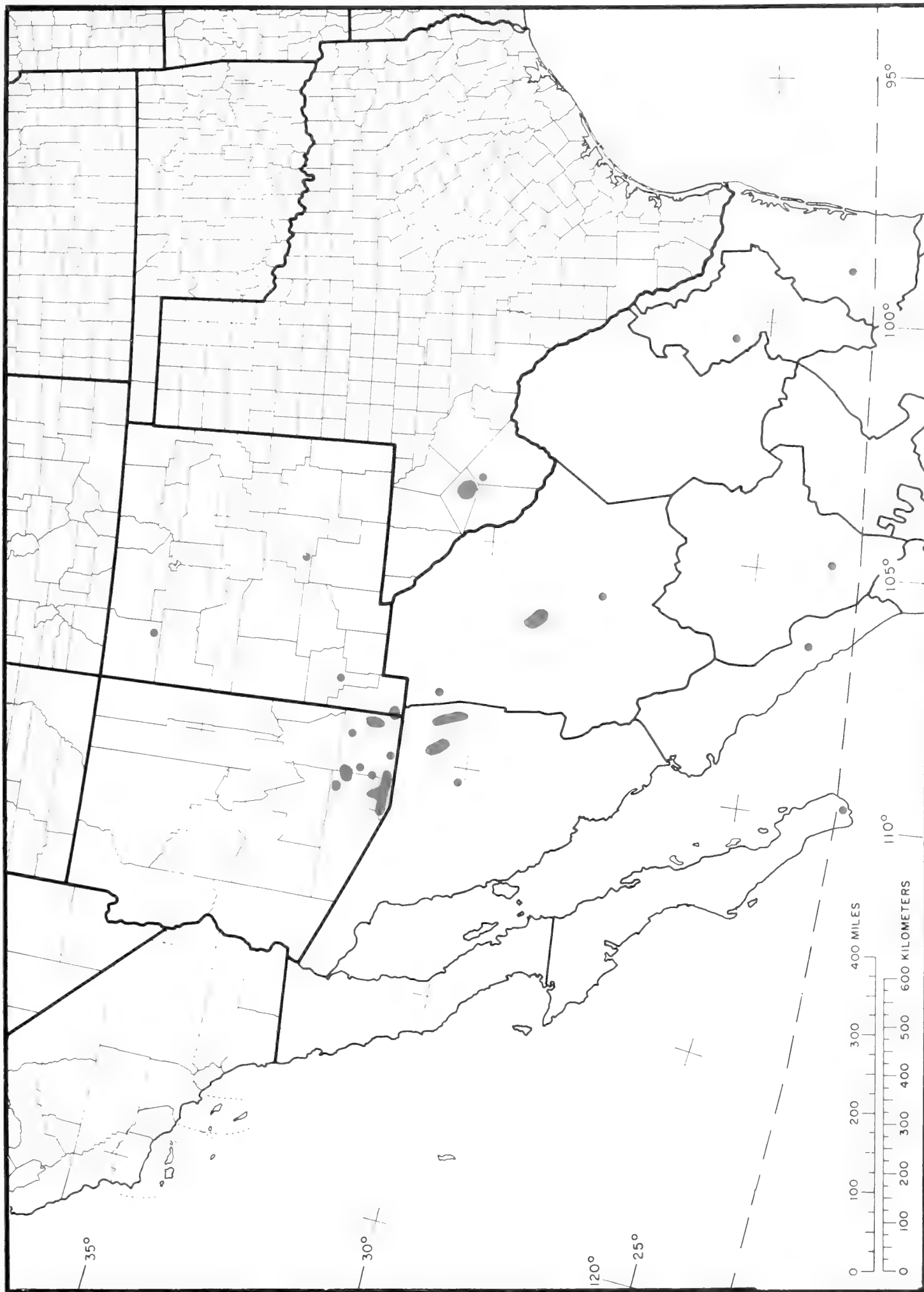
Map 182-N. *Salix sitchensis* Sanson. Sitka willow.



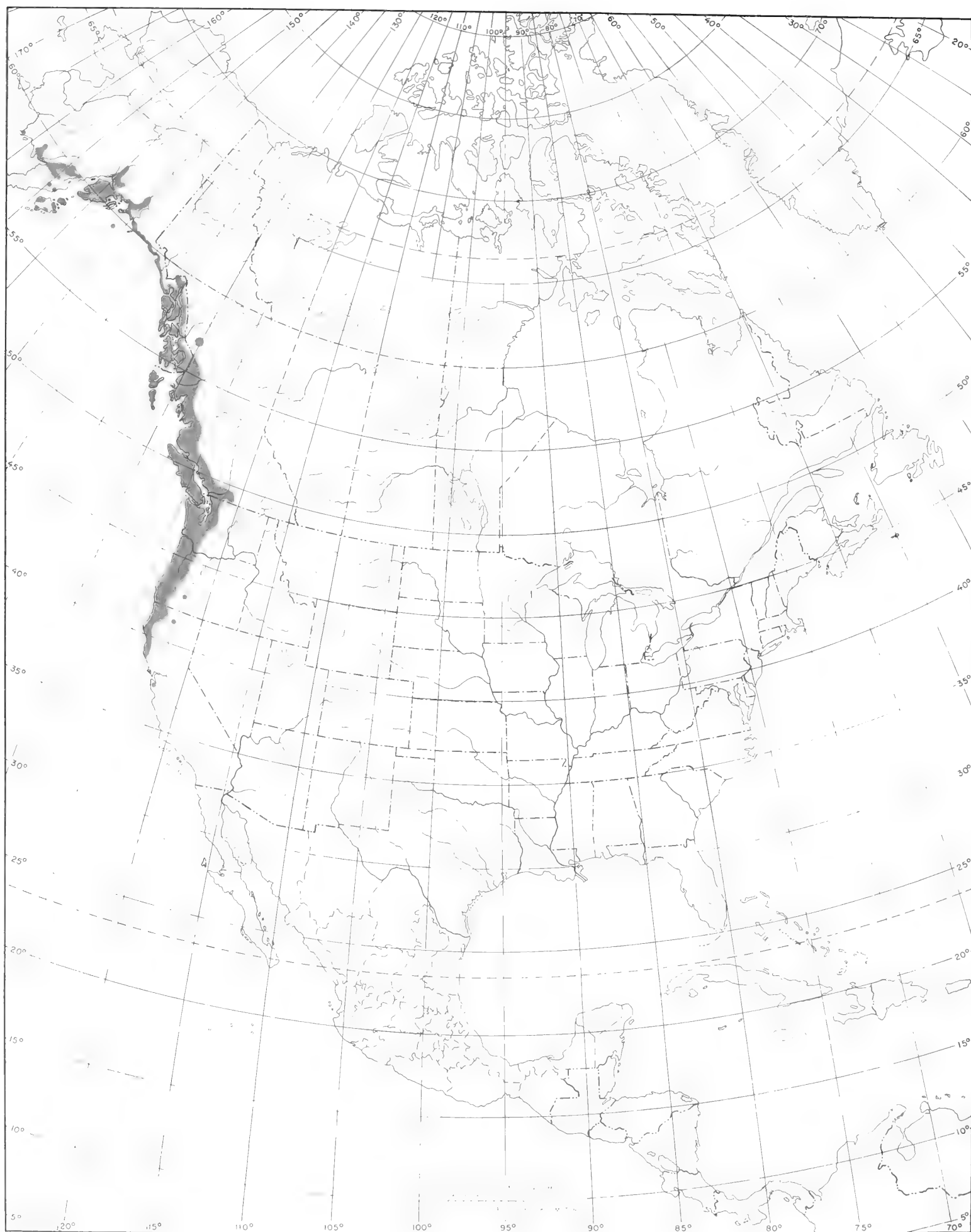
Map 182-W. *Salix sitchensis* Sanson, Sitka willow.



Map 183-N. *Salix taxifolia* H.B.K., yewleaf willow.



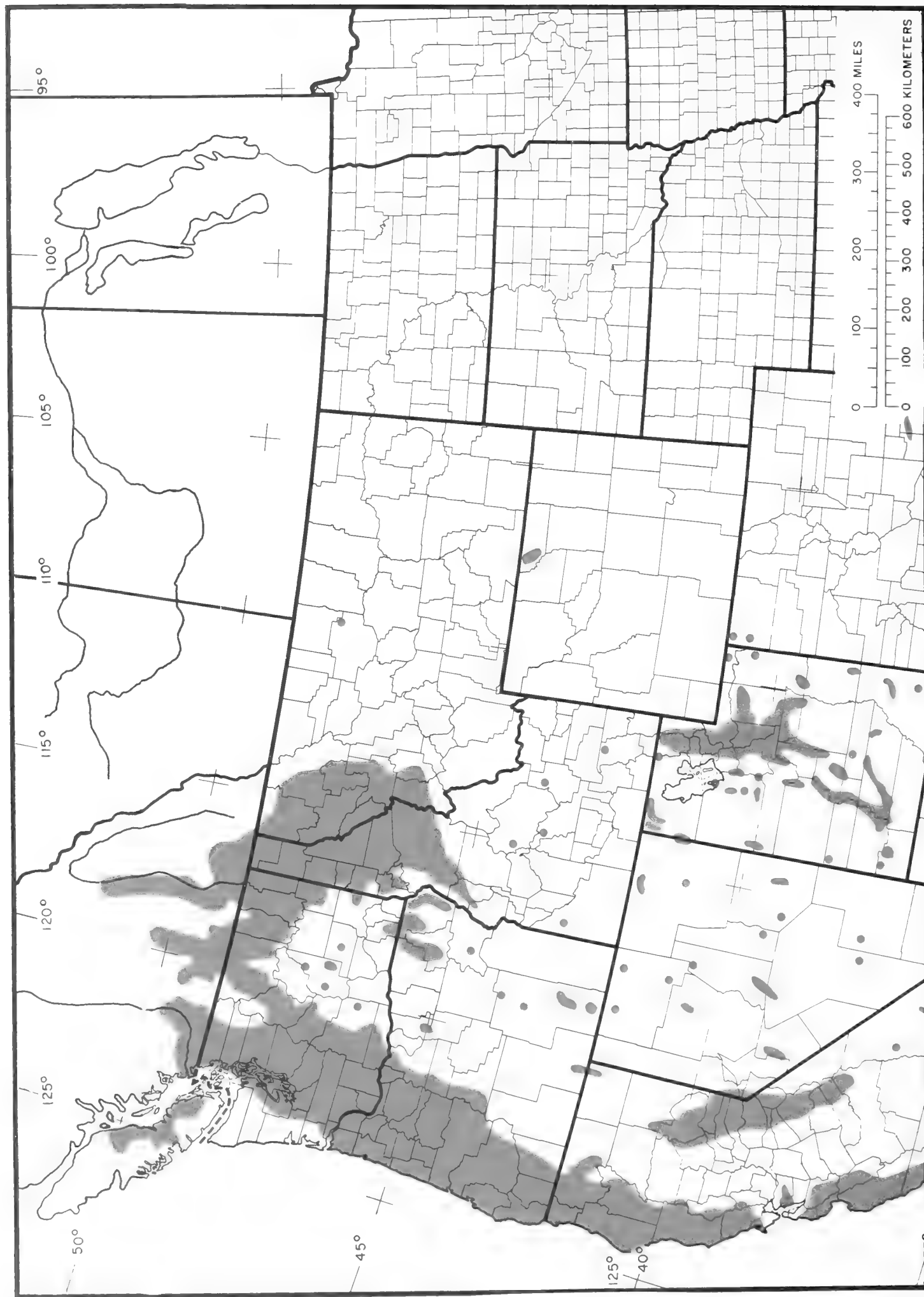
Map 183-SW. *Salix taxifolia* H.B.K., yewleaf willow.



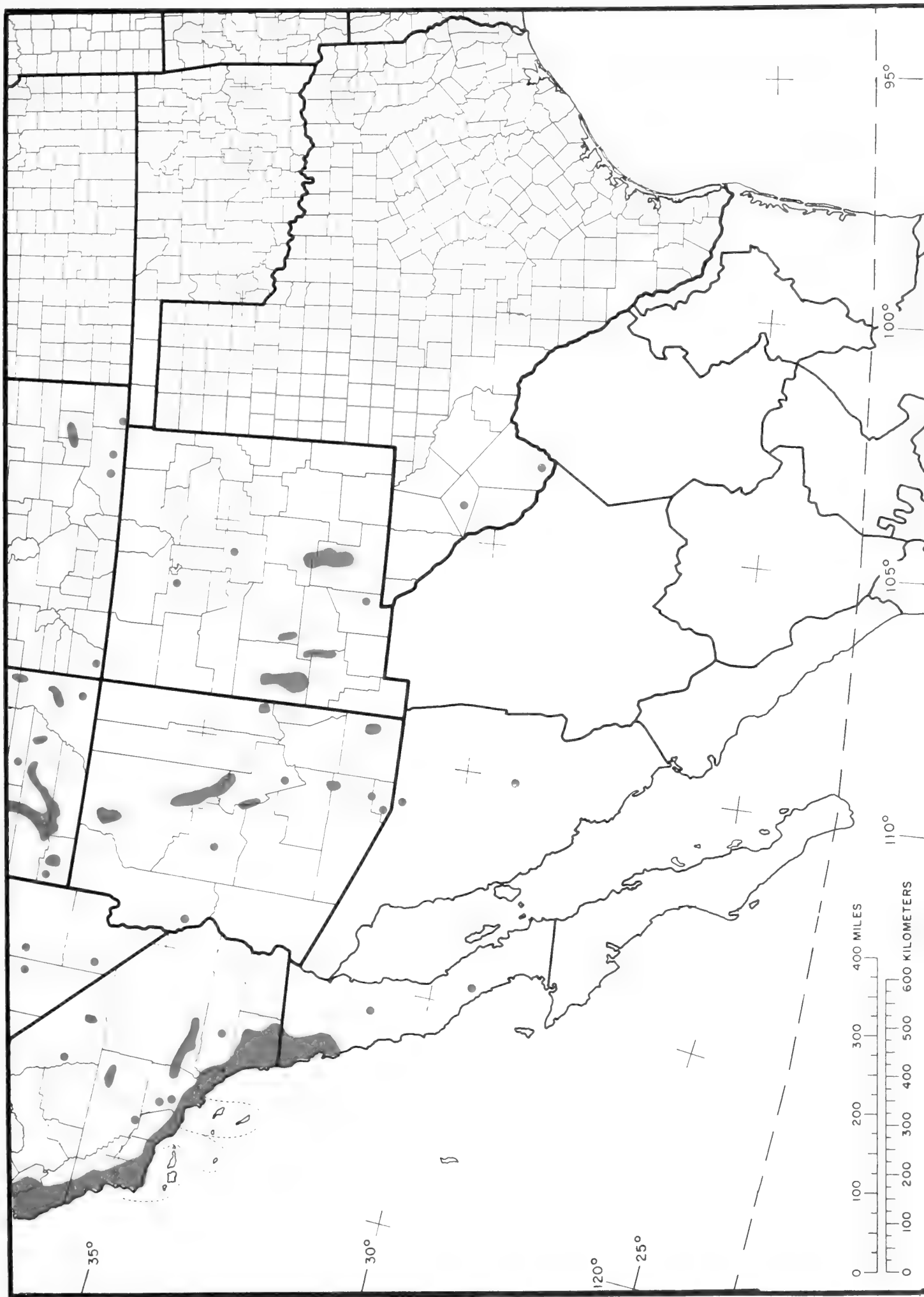
Map. 184-N. *Sambucus callicarpa* Greene, Pacific red elder.



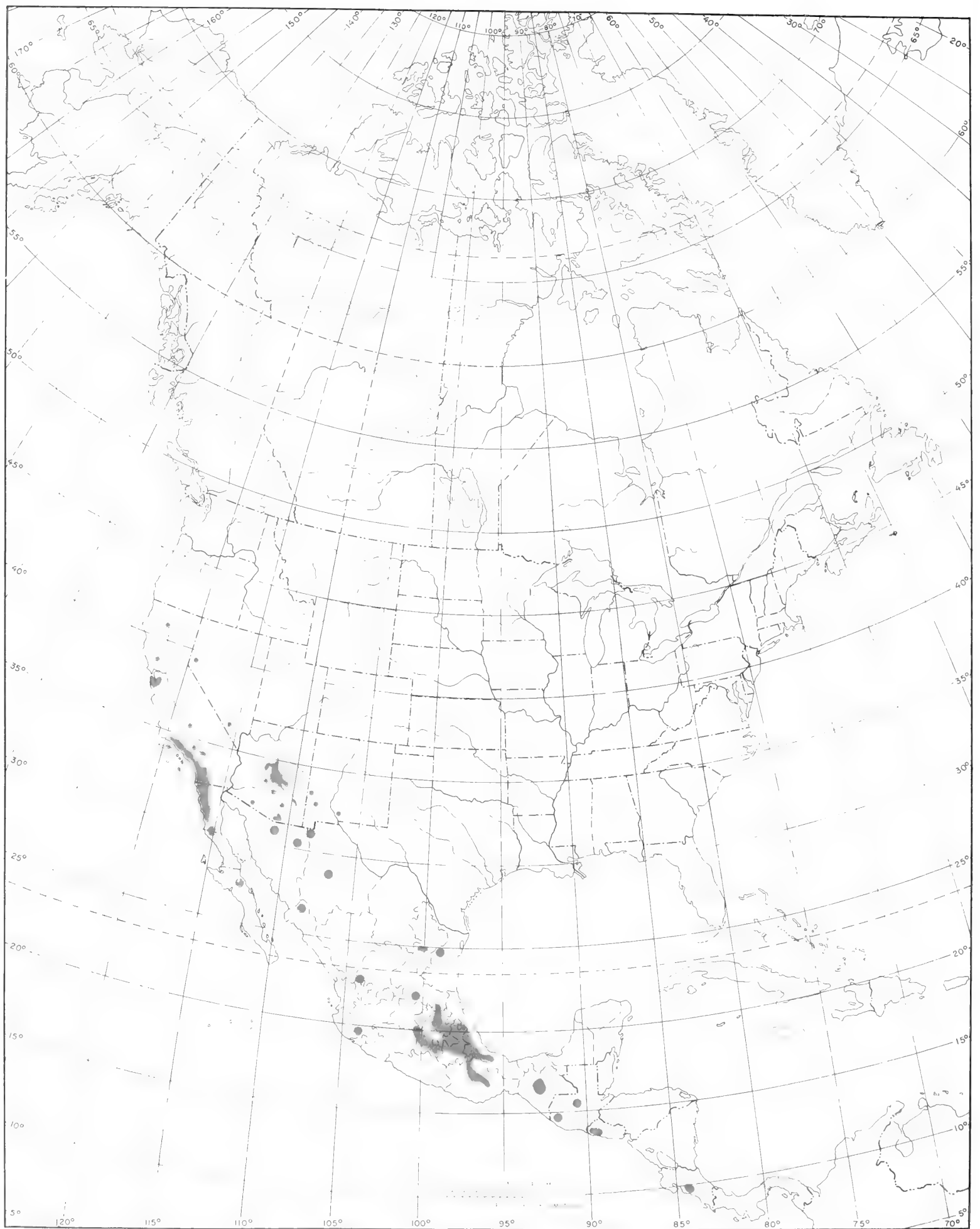
Map 184-W. *Sambucus callicarpa* Greene, Pacific red elder.



Map 185-NW. *Sambucus glauca* Nutt., blueberry elder, northern range.



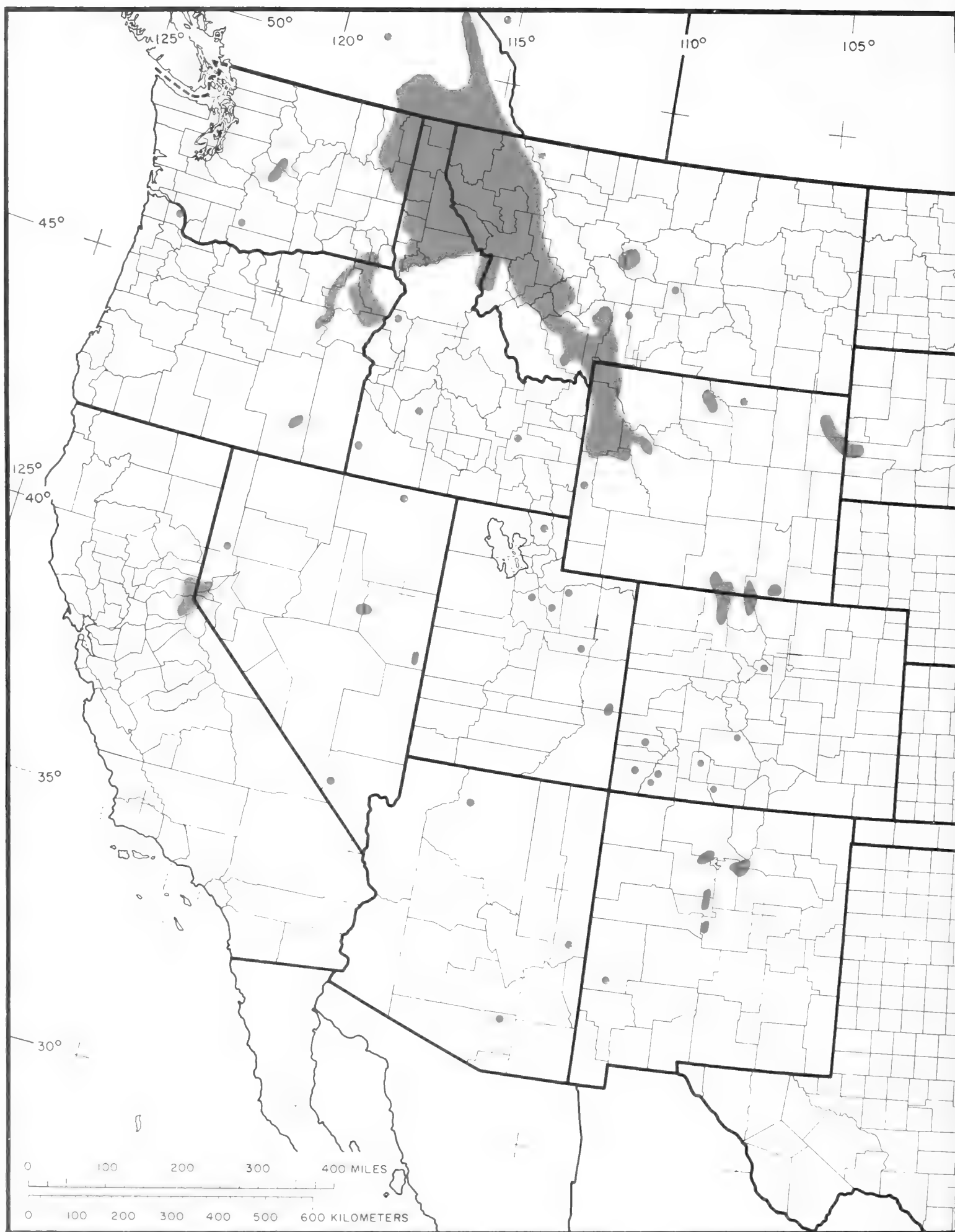
Map 185-SW. *Sambucus glauca* Nutt., blueberry elder, southern range.



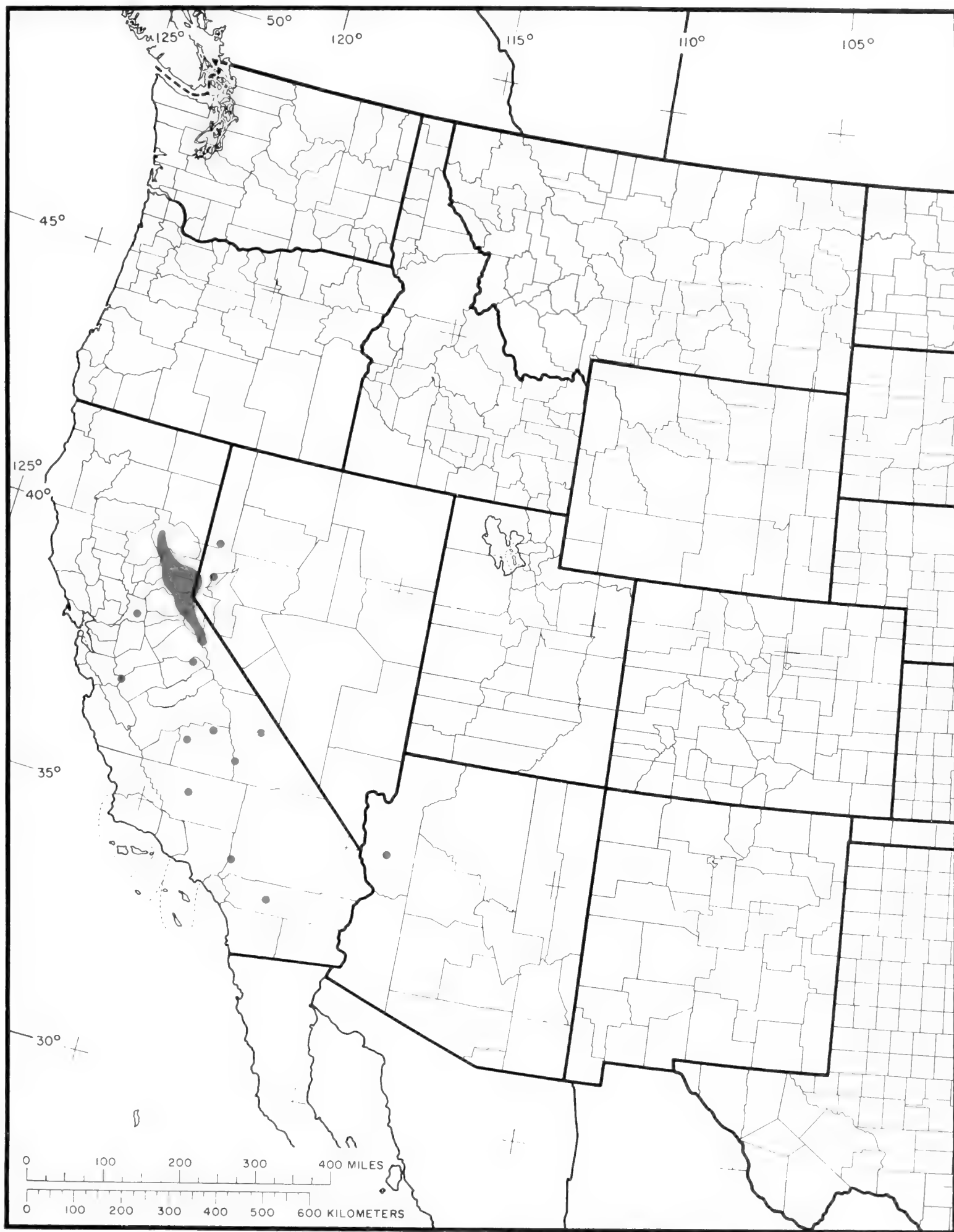
Map 186-N. *Sambucus mexicana* Presl. Mexican elder.



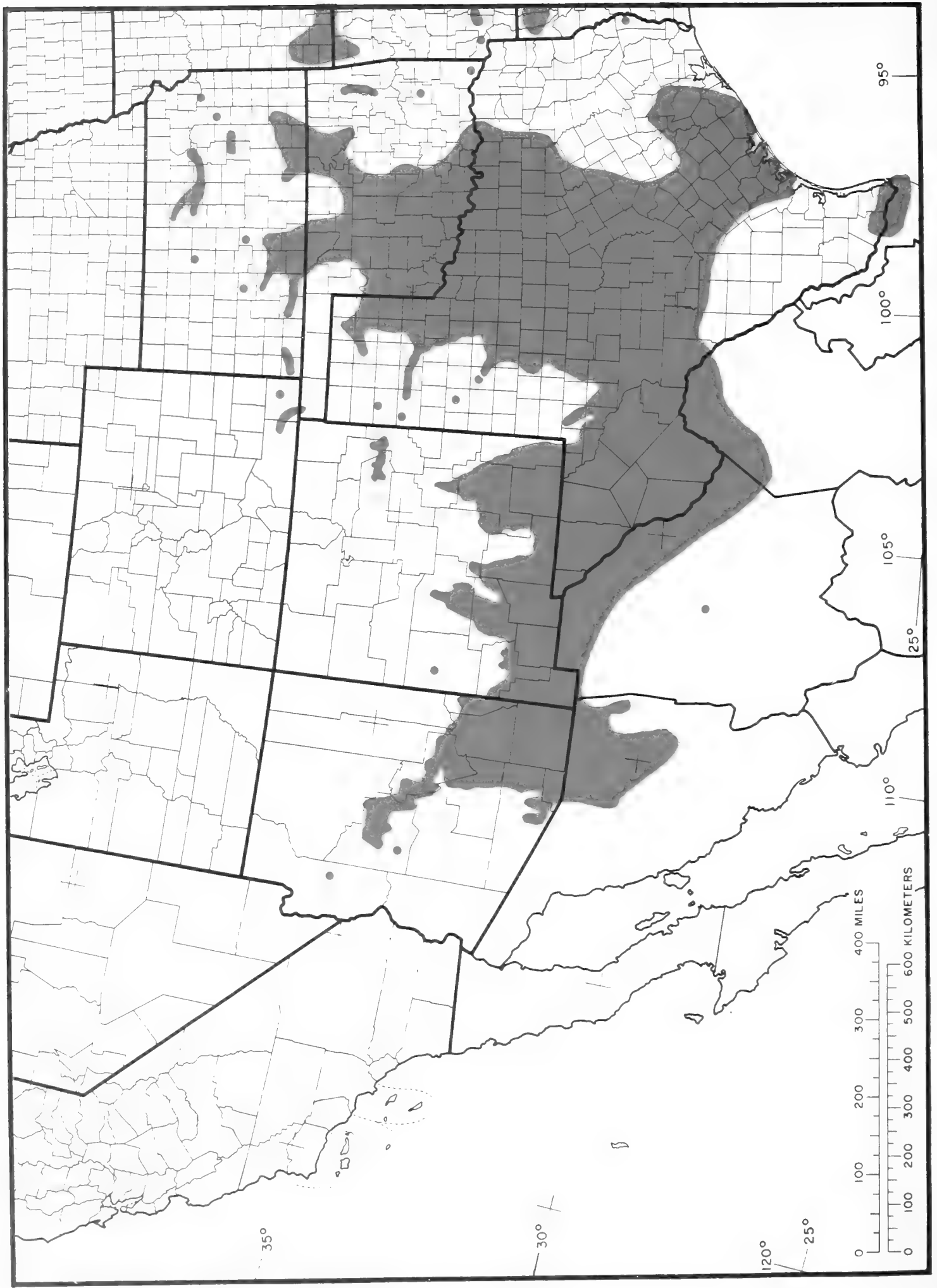
Map 186-W. *Sambucus mexicana* Presl, Mexican elder.



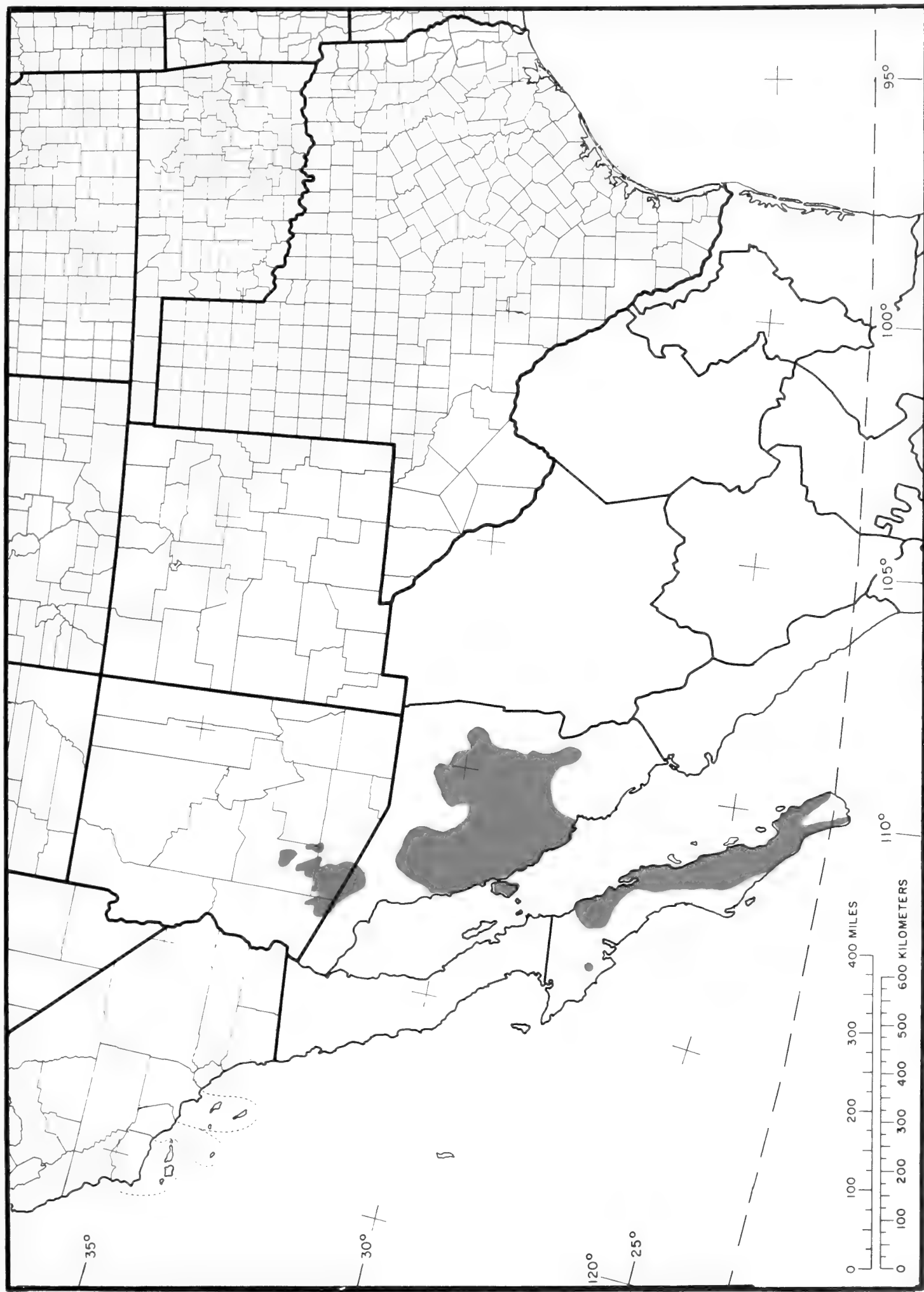
Map 187. *Sambucus melanocarpa* A. Gray. blackhead elder.



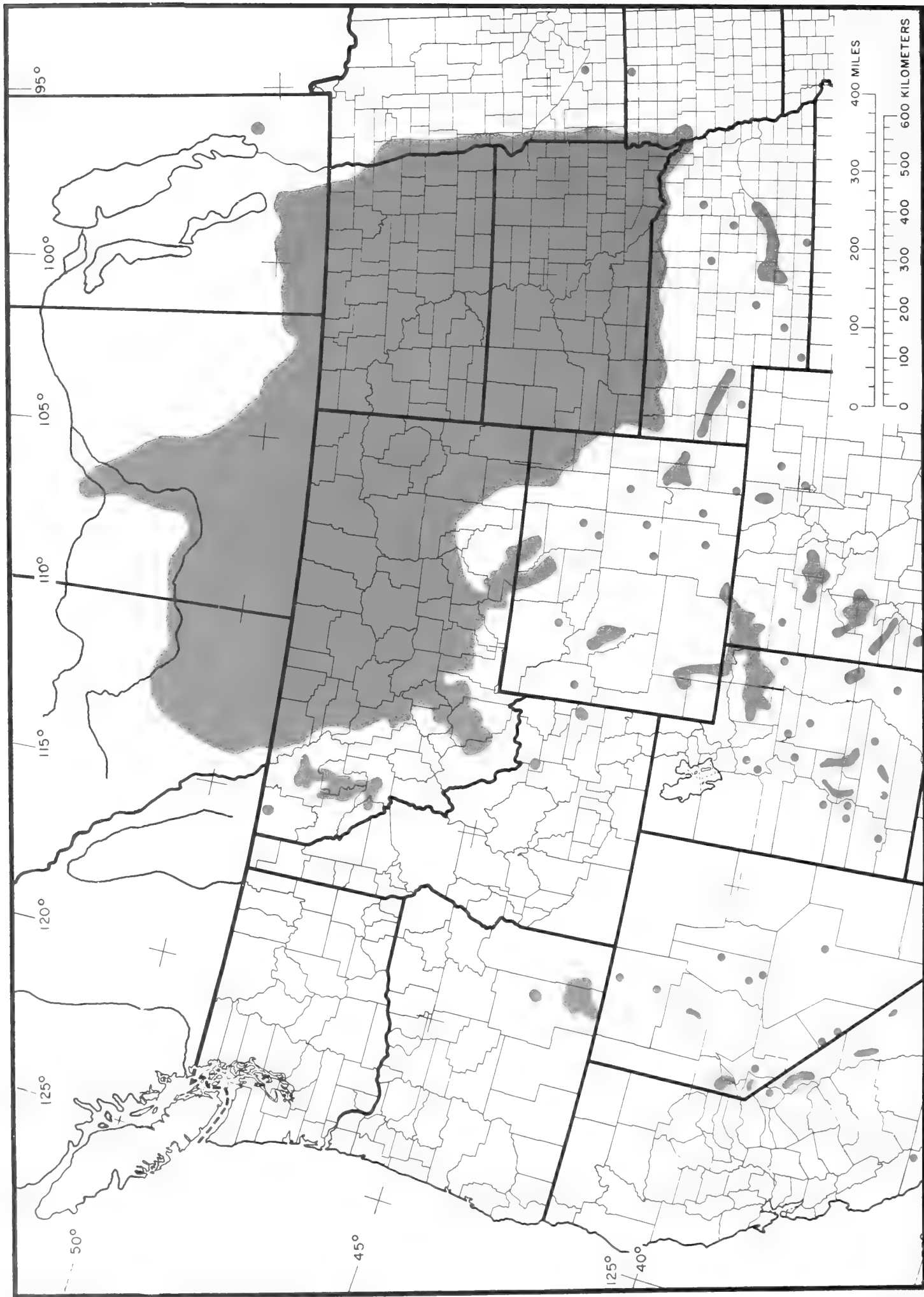
Map 188. *Sambucus velutina* Durand & Hilgard, velvet elder.



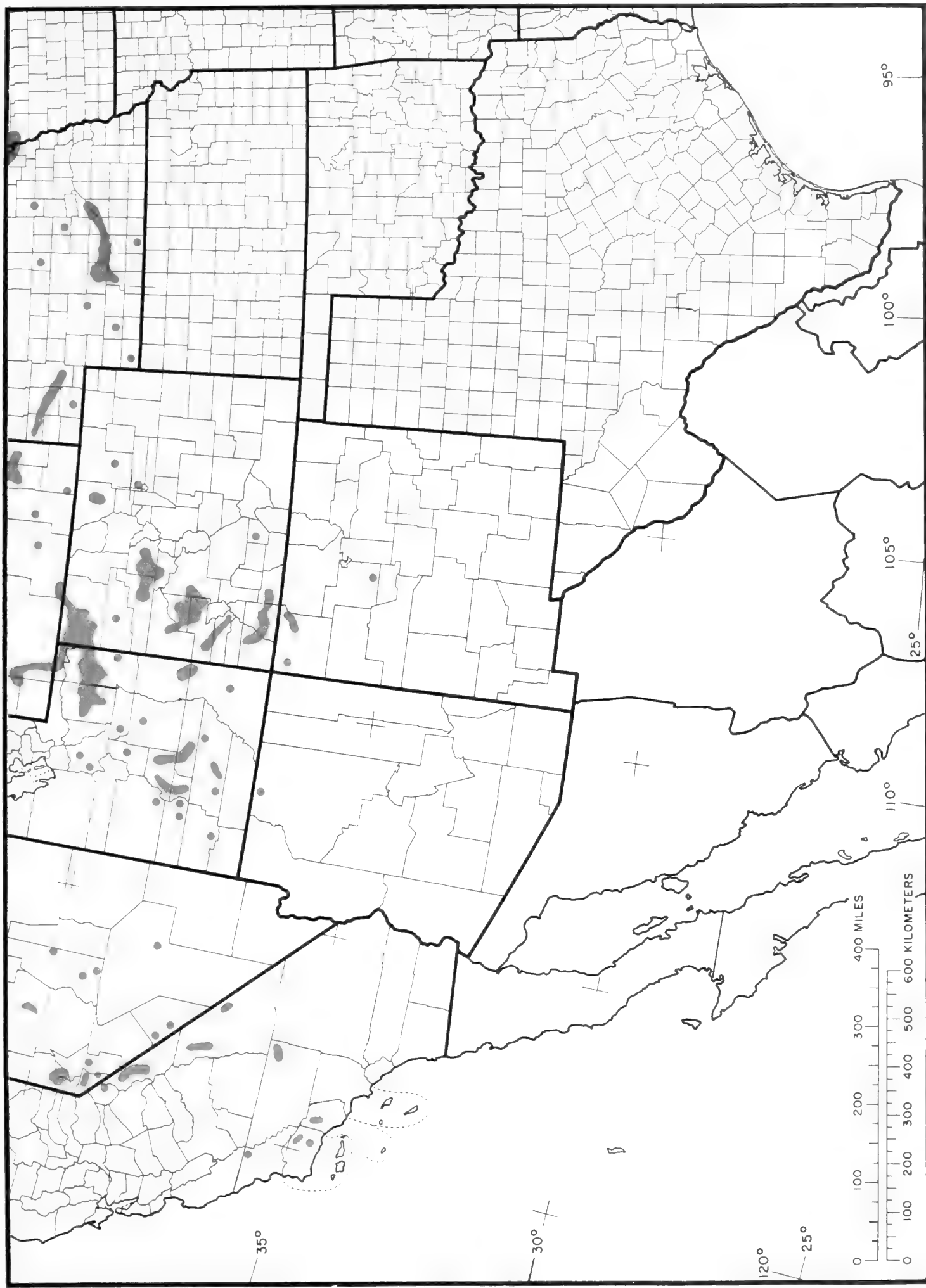
Map 189. *Sapindus drummondii* Hook. & Arn., western soapberry, western range, Eastern range in Volume 4.



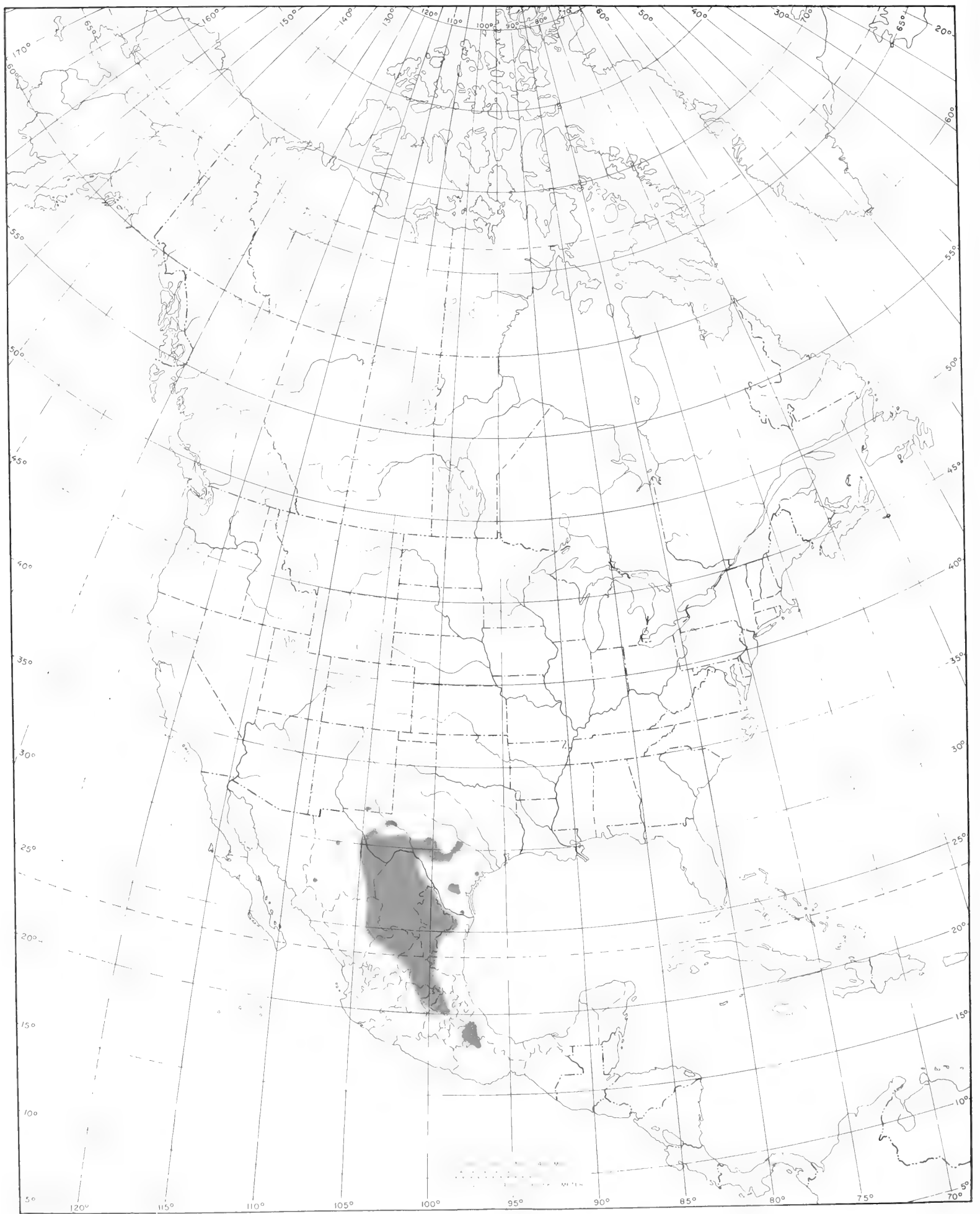
Map 190. *Sapium biloculare* (S. Wats.) Pax, jumping-bean sapium. Southwestern Arizona and northwestern Mexico.



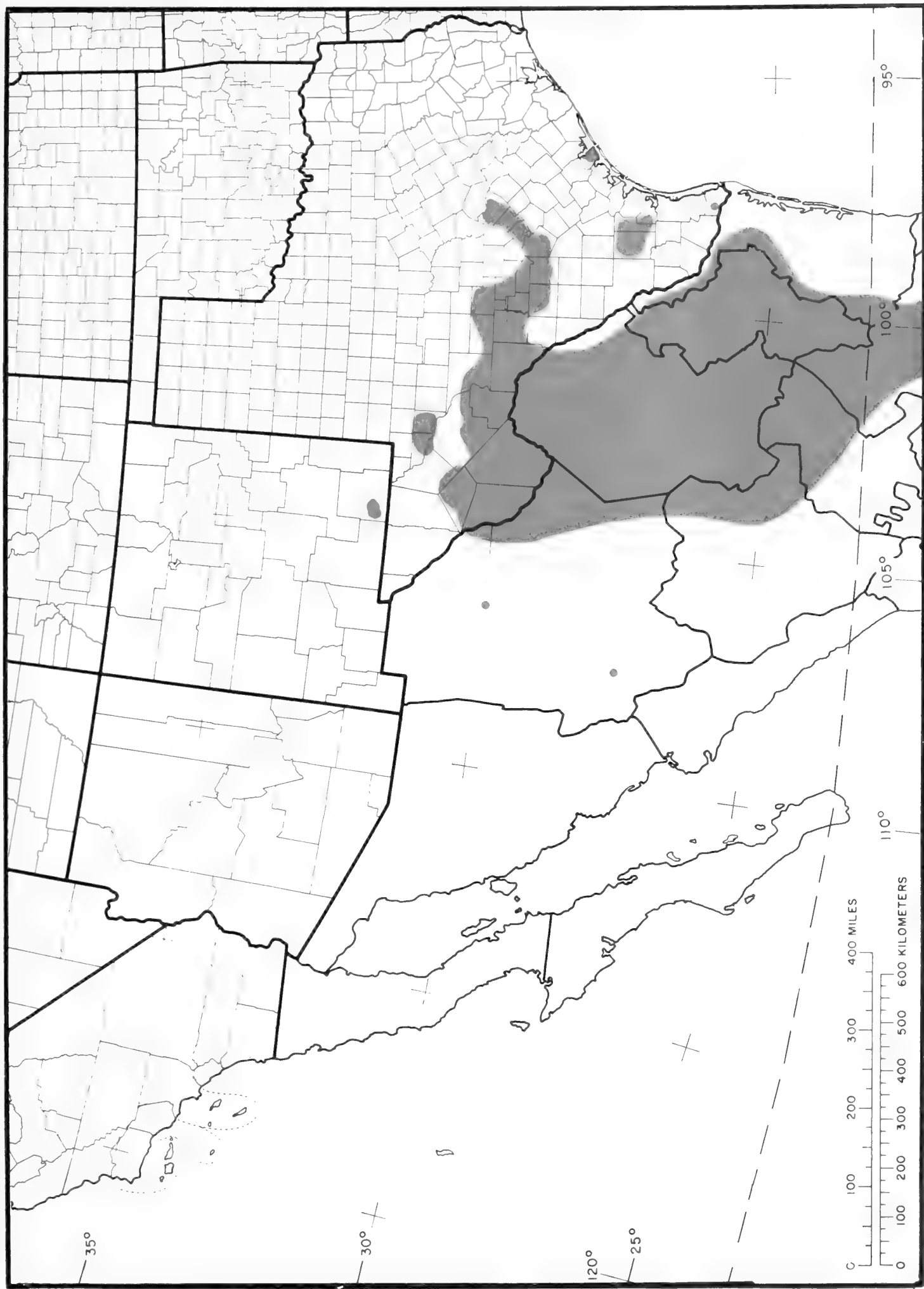
Map 191-NW. *Shepherdia argentea* (Pursh) Nutt., silver buffaloberry, northern range.



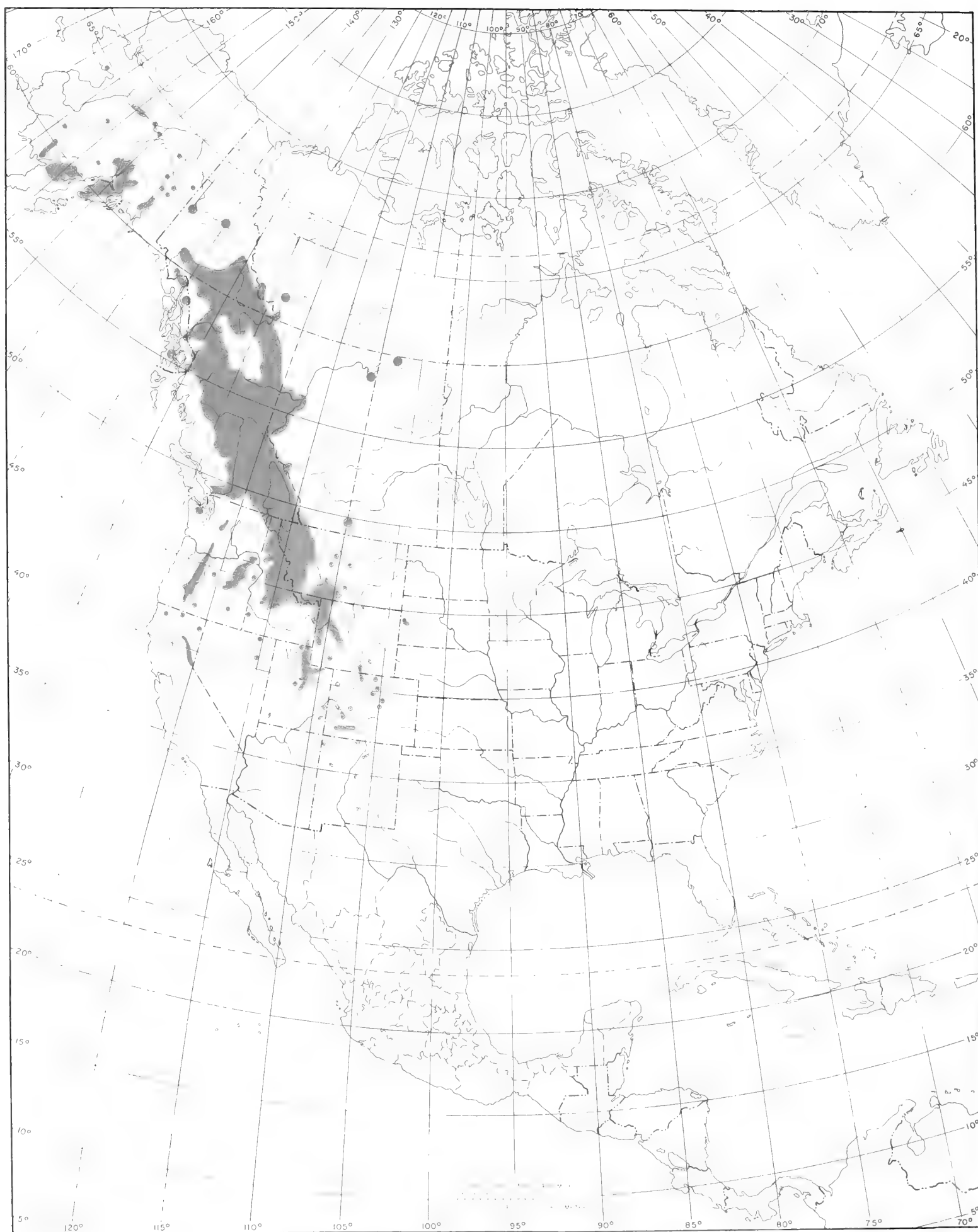
Map 191-SW. *Shepherdia argentea* (Pursh) Nutt., silver buffaloberry, southern range.



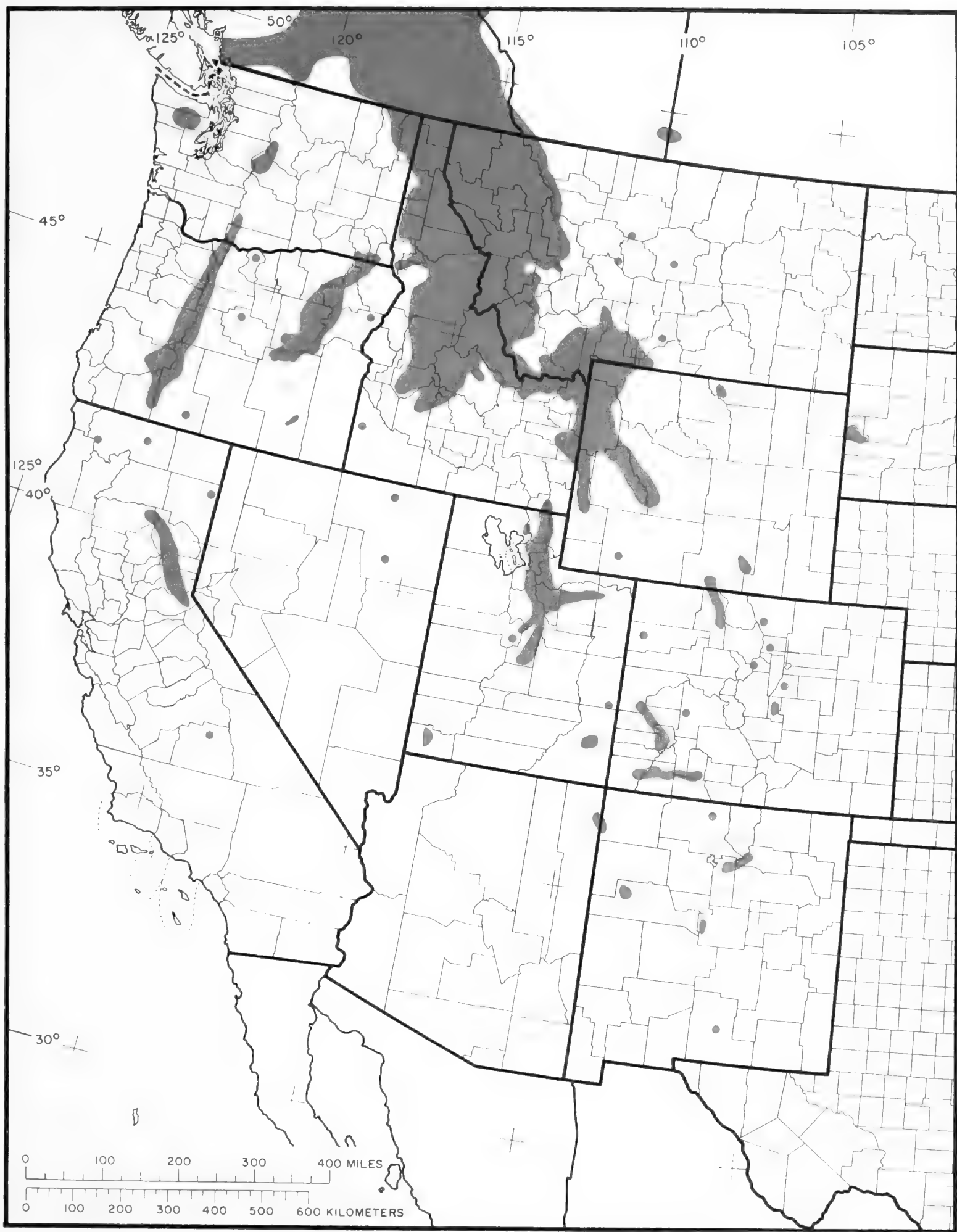
Map 192-N. *Sophora secundiflora* (Ortega) Lag., mescalbean.



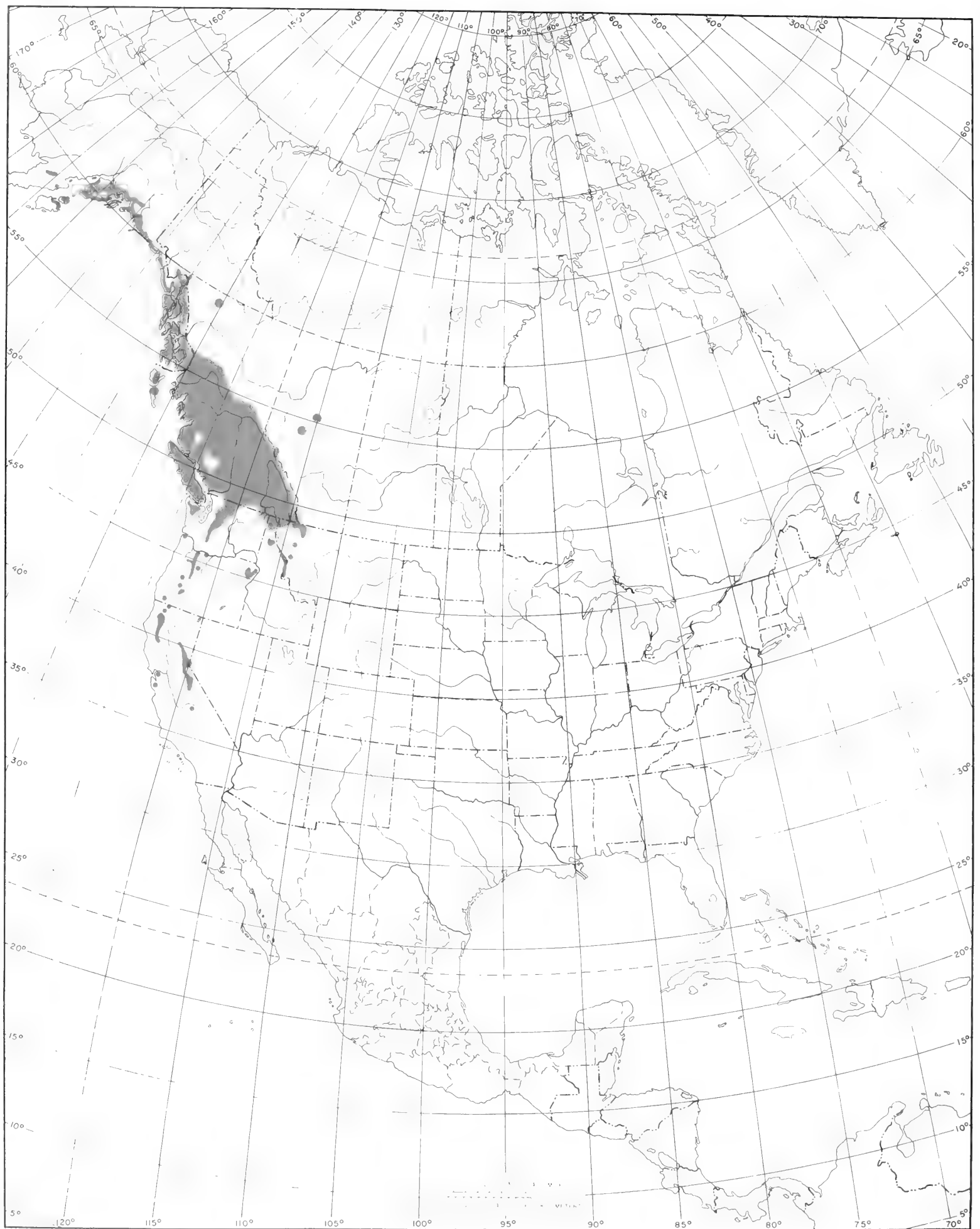
Map 192-SW. *Sophora secundiflora* (Ortega) Lag., mescalbean.



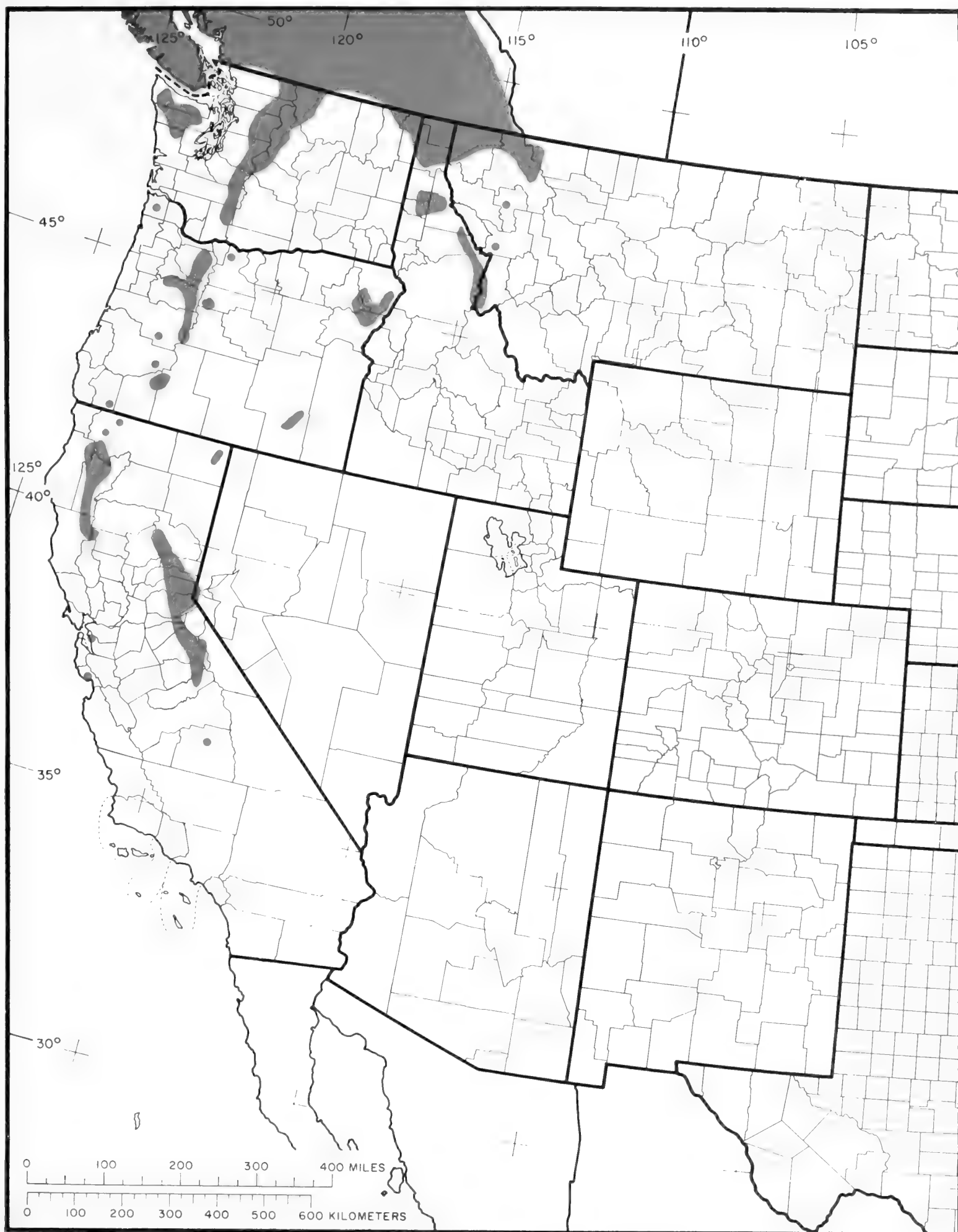
Map 193-N. *Sorbus scopulina* Greene. Greene mountain-ash.



Map 193-W. *Sorbus scopulina* Greene, Greene mountain-ash.



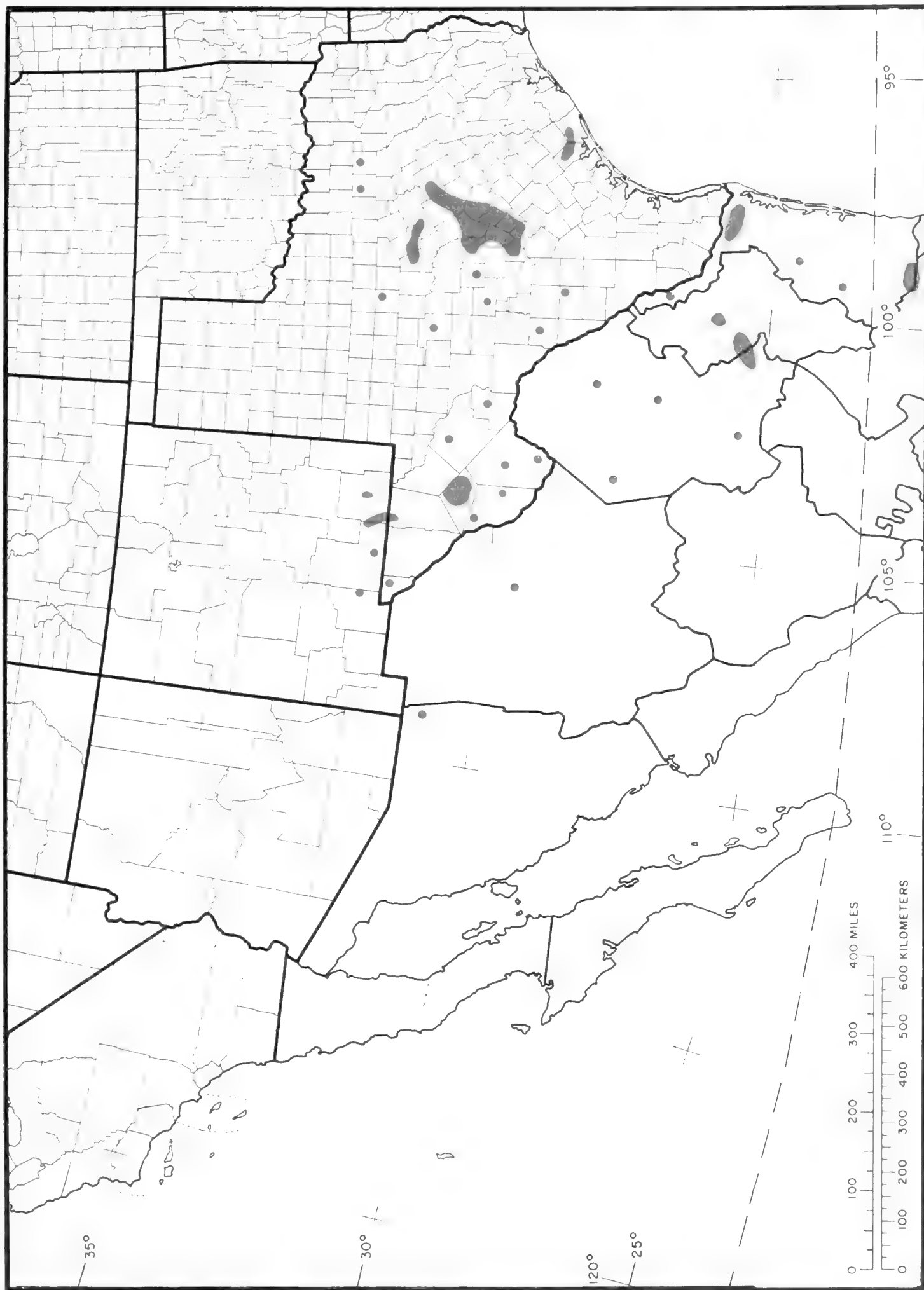
Map 194-N. *Sorbus sitchensis* Roem., Sitka mountain-ash.



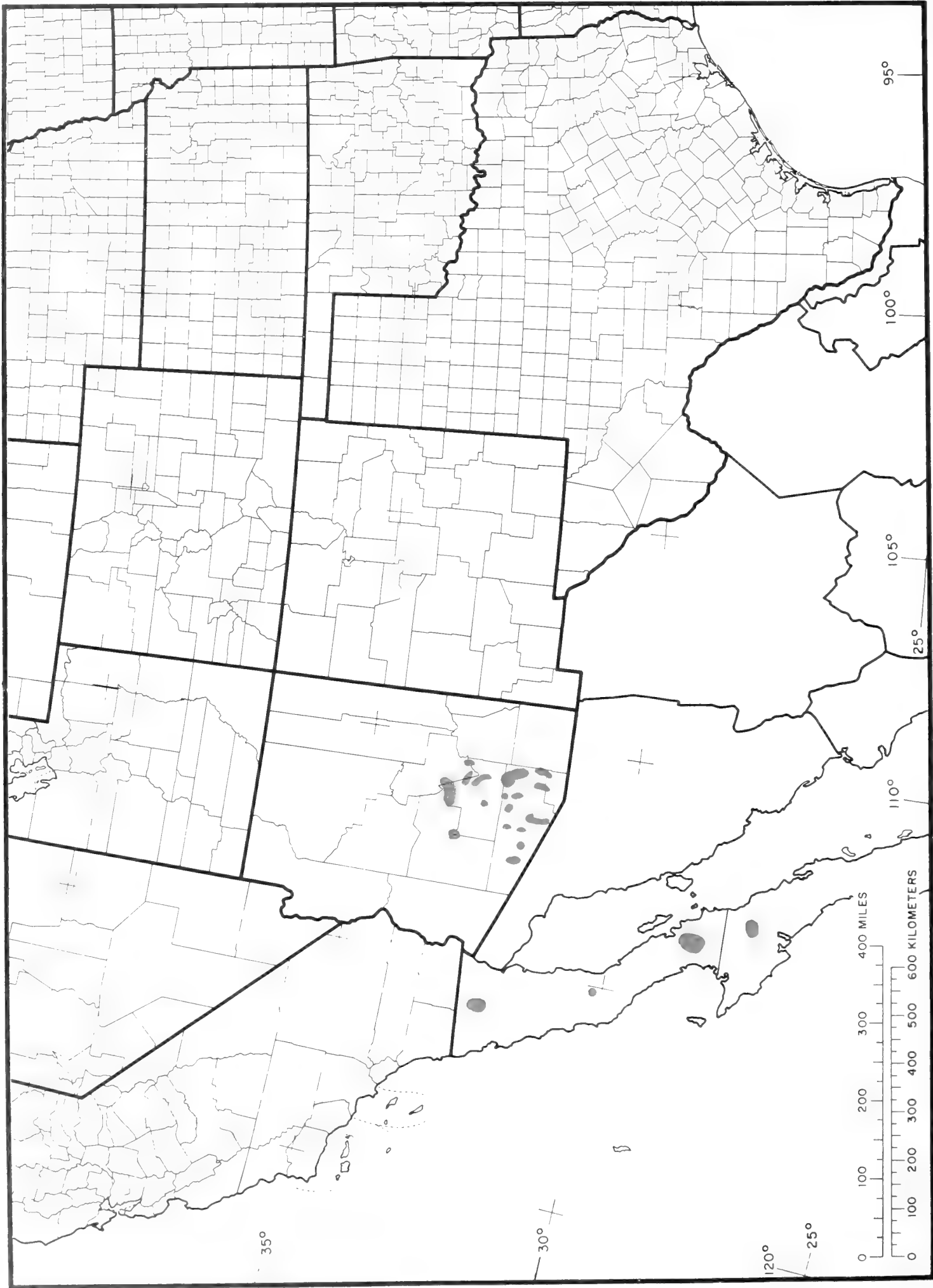
Map 194-W. *Sorbus sitchensis* Roem., Sitka mountain-ash.



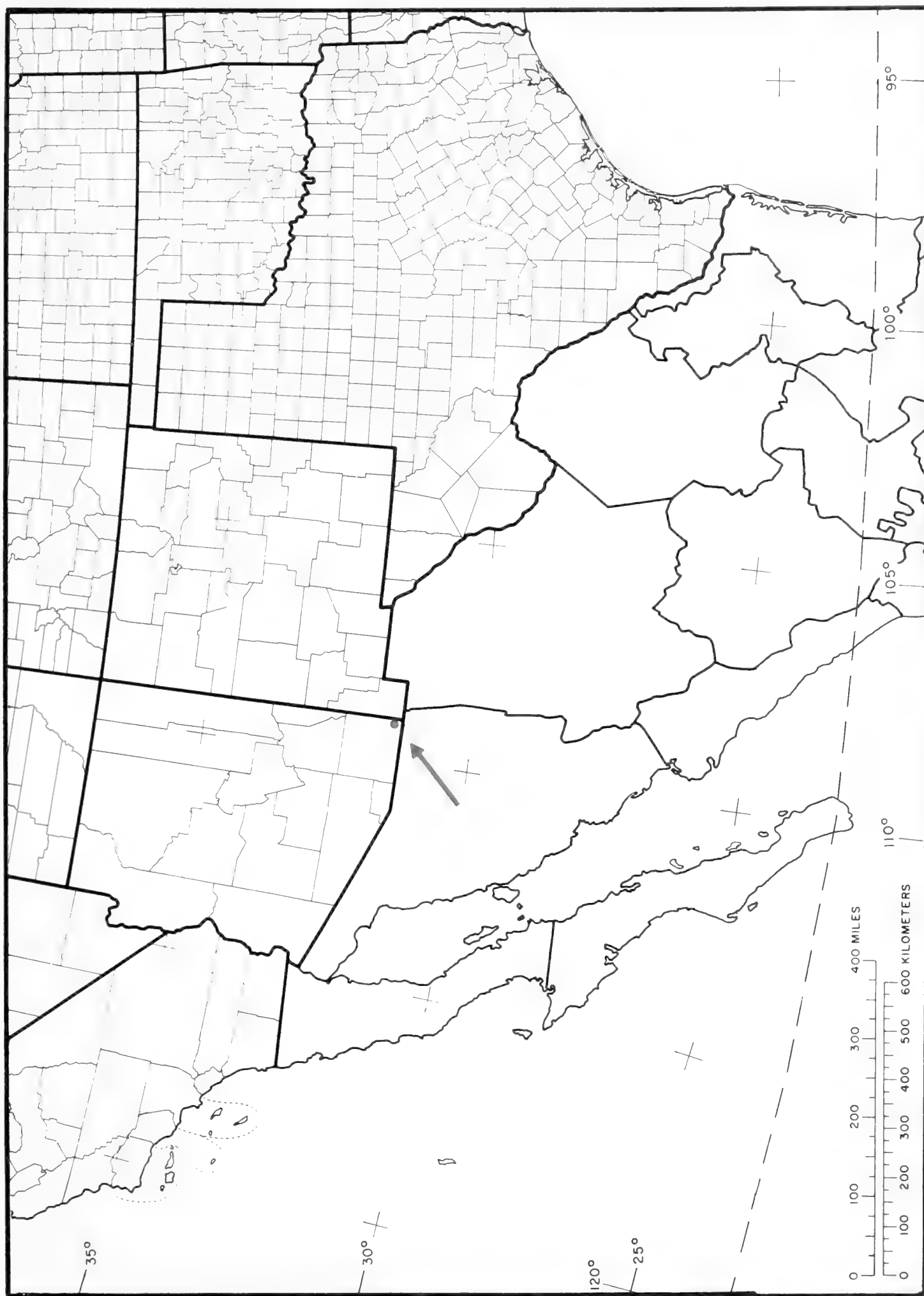
Map 195. *Staphylea bolanderi* A. Gray. Sierra bladdernut. California only.



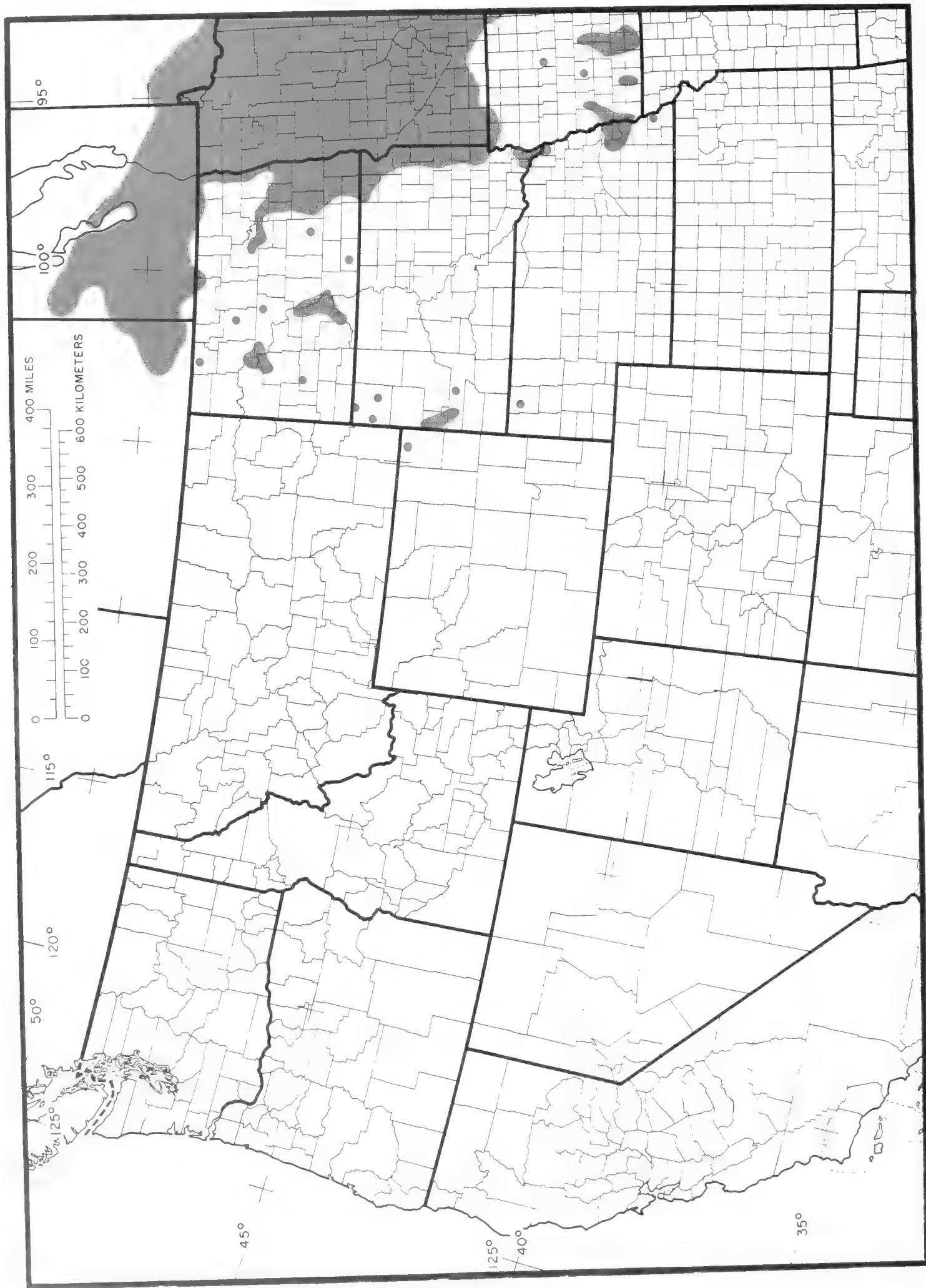
Map 196. *Ungnadia speciosa* Endl., Mexican-buckeye.



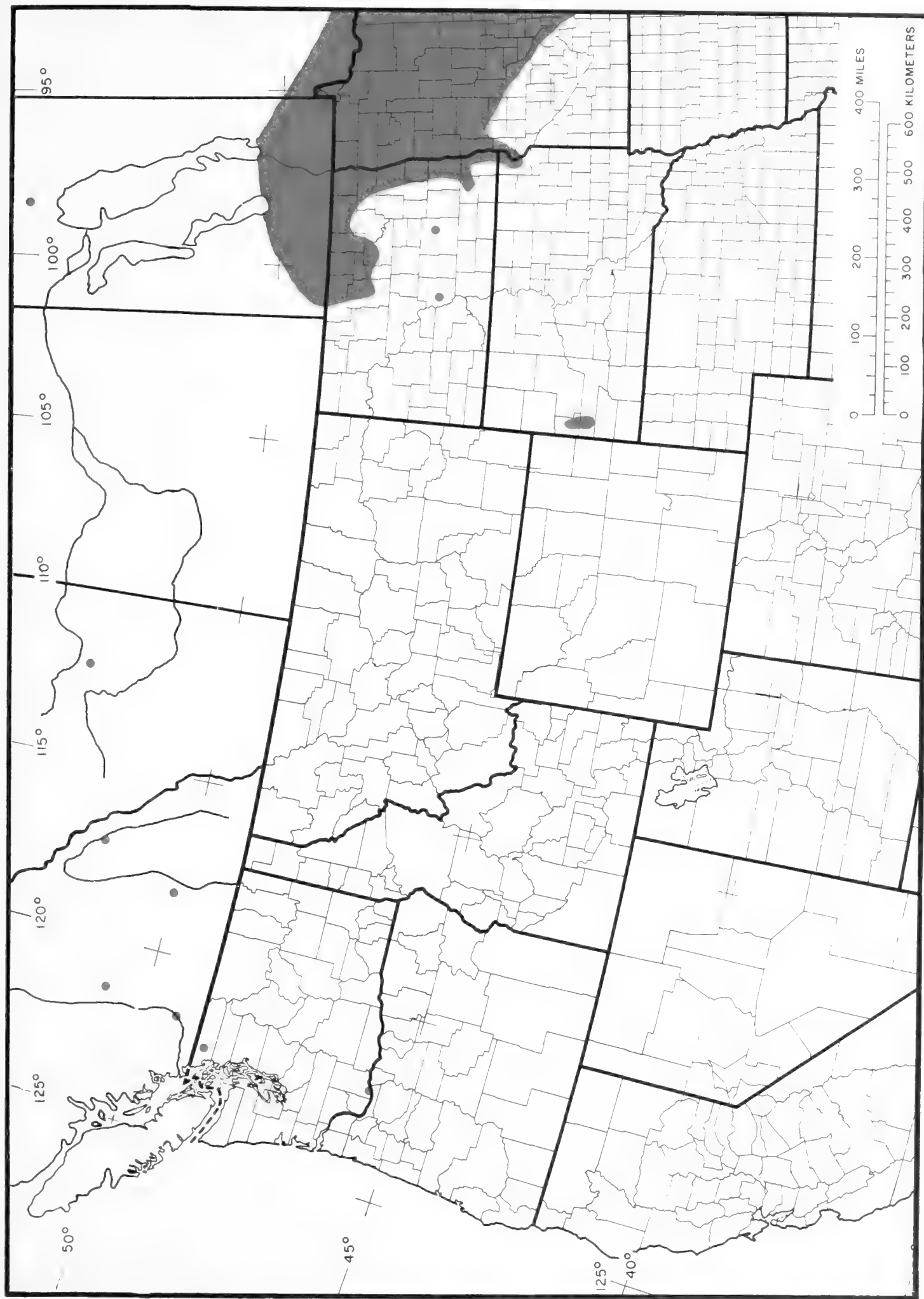
Map 197. *Vauquelinia californica* (Torr.) Sarg., *Torrey vauquelinia*. Southern Arizona and Baja California only.



Map 198. *Vauquelinia pauciflora* Standl., fewflower vauquelinia. Reported from northern Mexico.



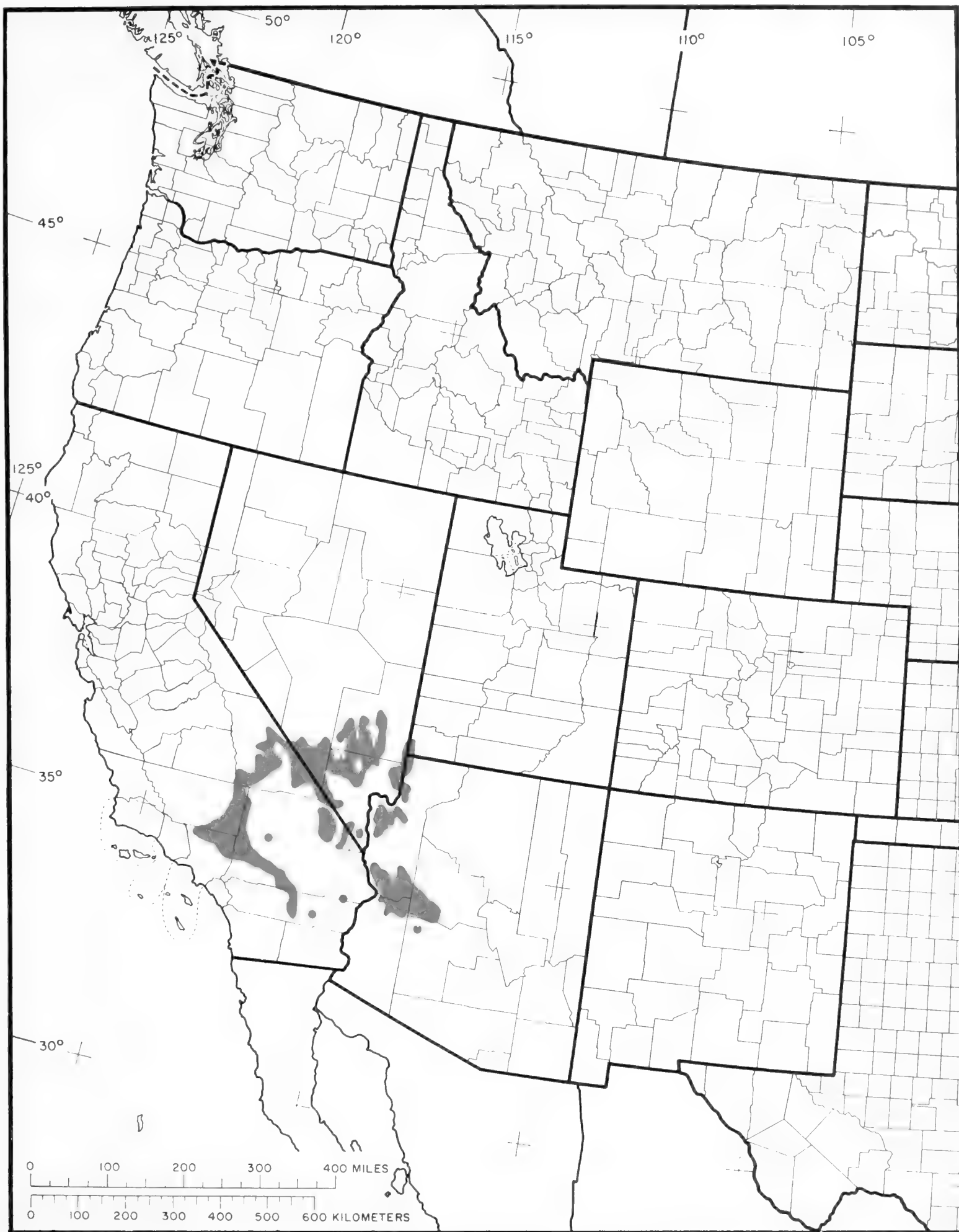
Map 199. *Viburnum lentago* L., nannyberry. Eastern range in Volume 4.



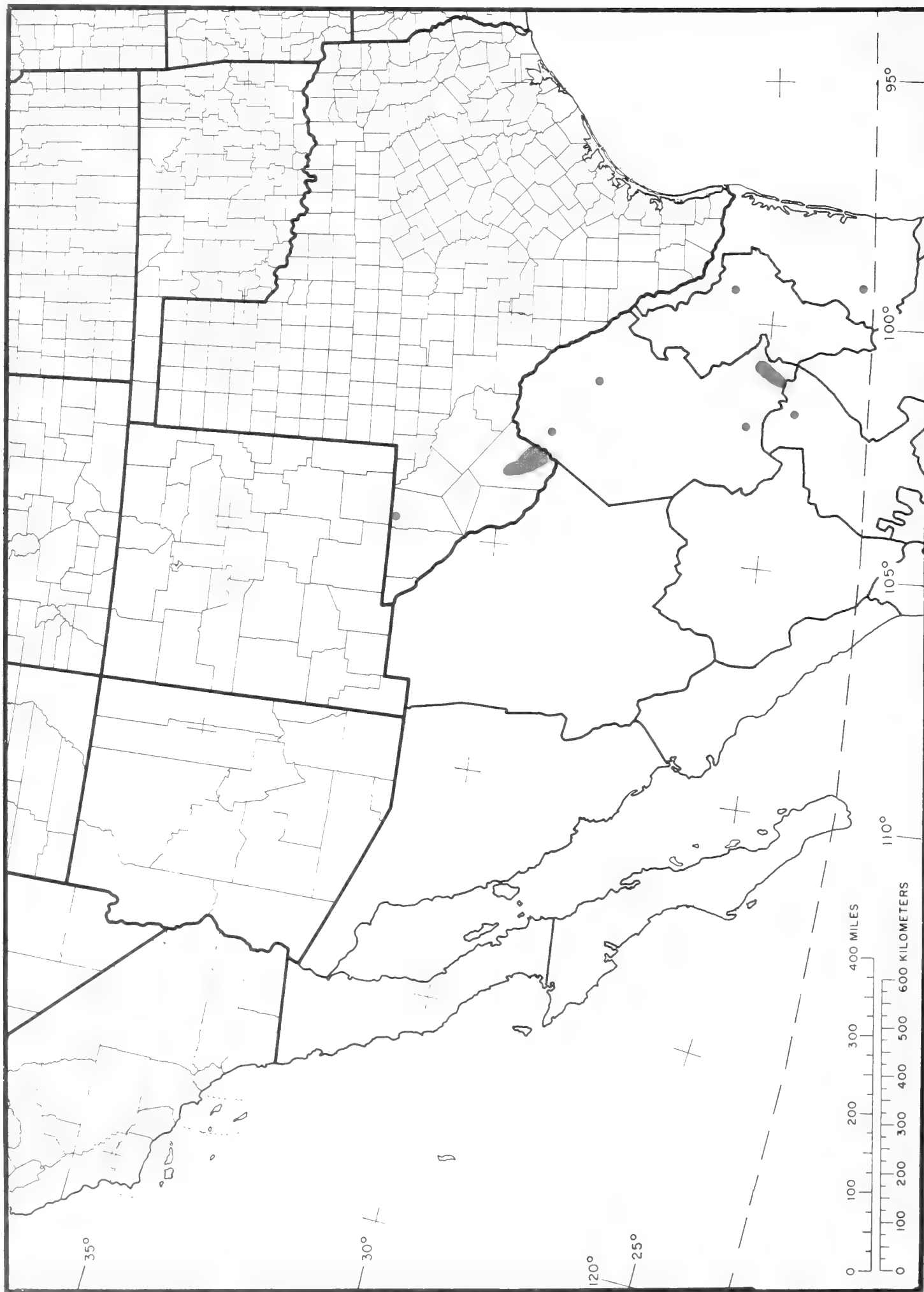
Map 200. *Viburnum trilobum* Marsh., American cranberrybush. Eastern range in Volume 4.



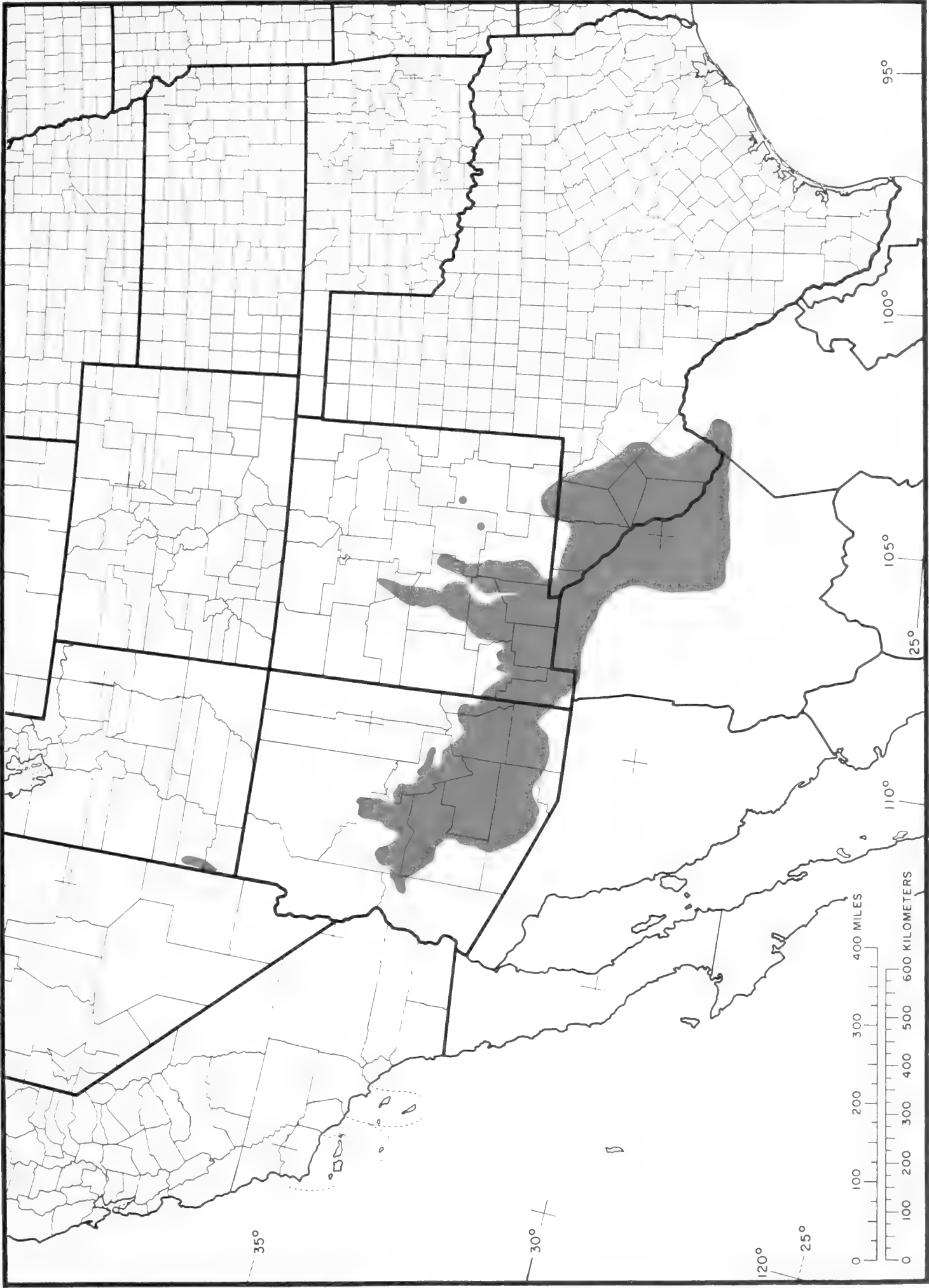
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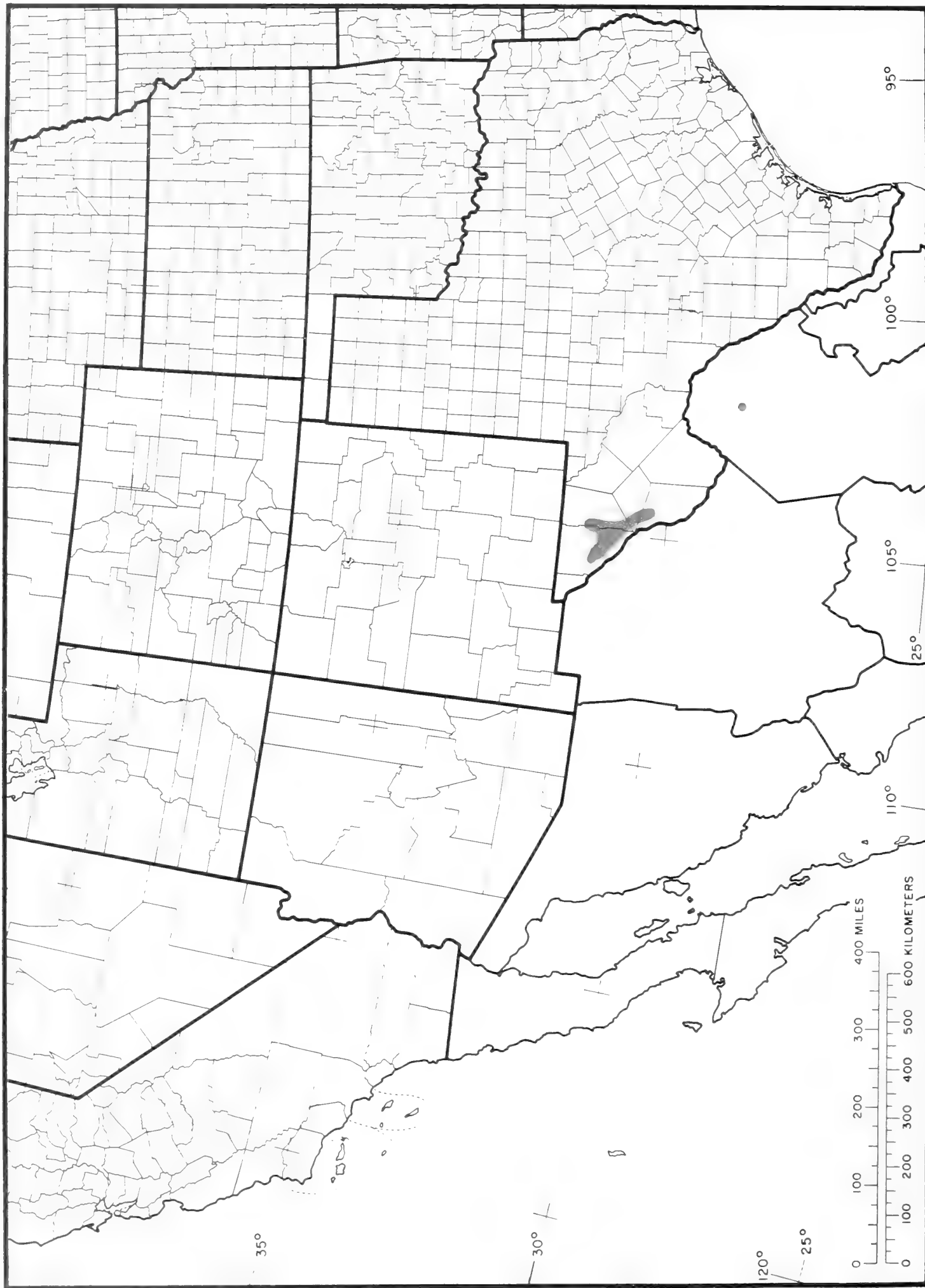
Map 202. *Yucca brevifolia* Engelm.. Joshua-tree.



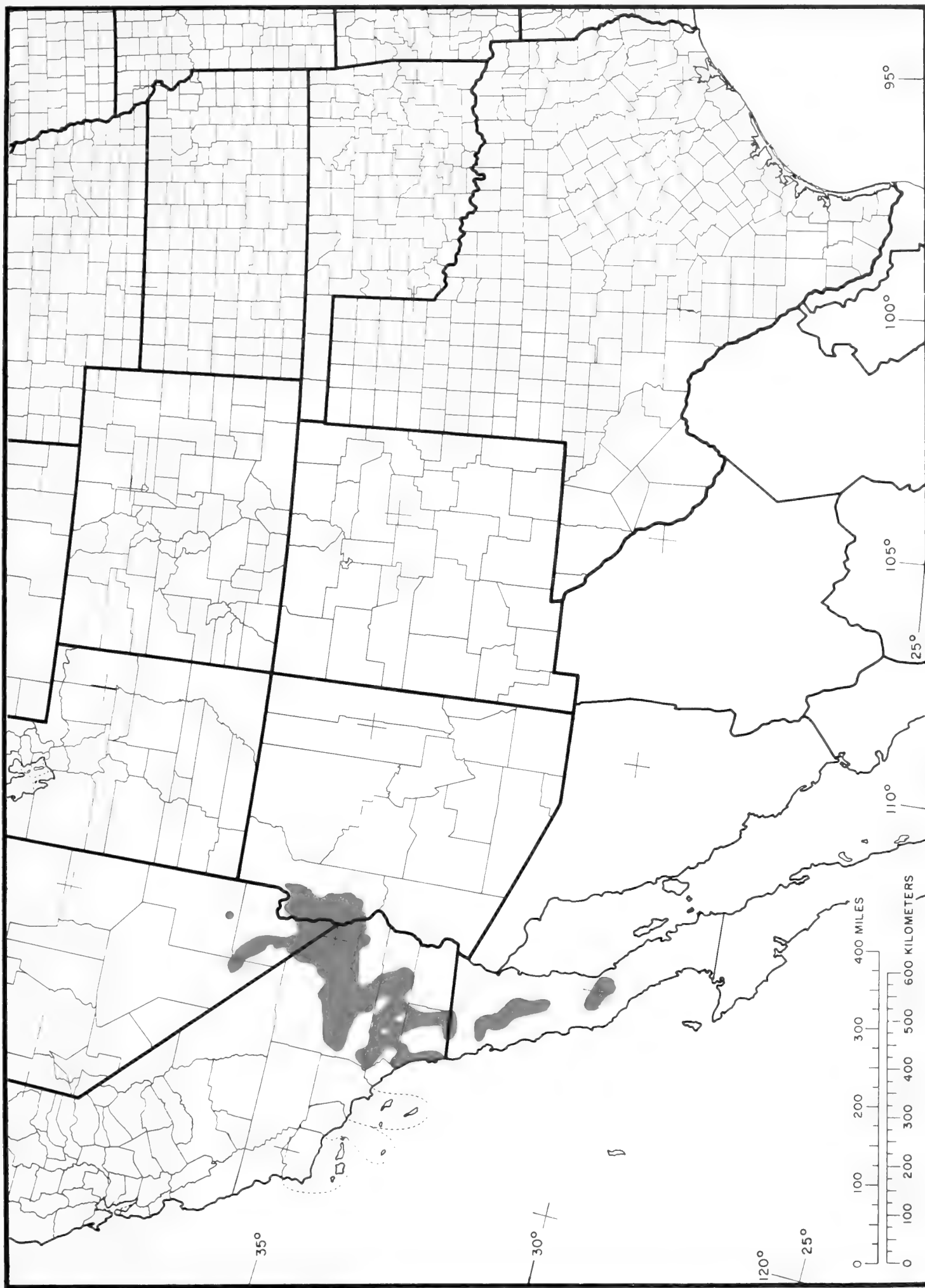
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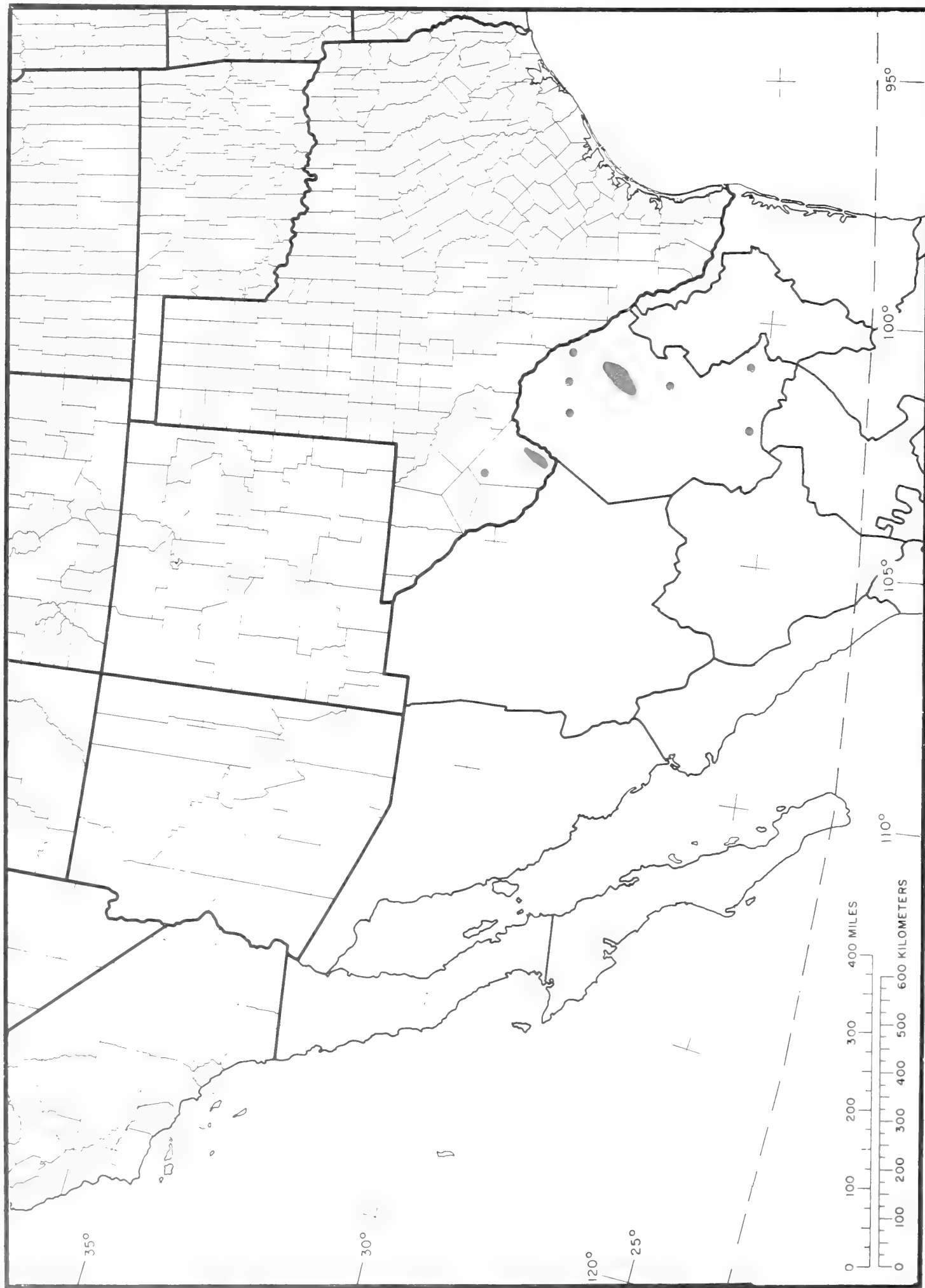
Map 204. *Yucca elata* Engelm., soap tree yucca.



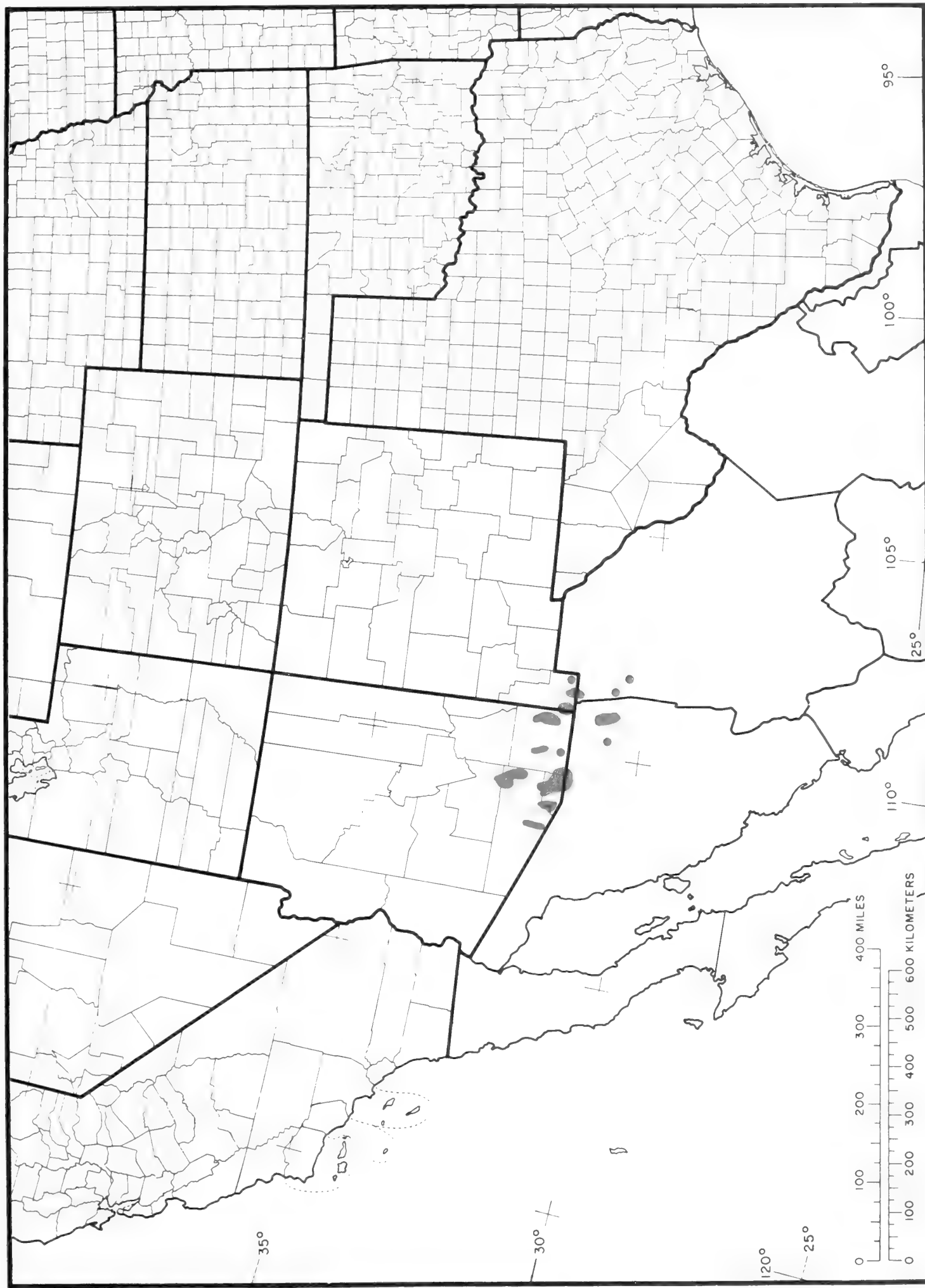
Map 205. *Yucca jaxoniana* Sarg., *Faxon yucca*. Trans-Pecos Texas and Coahuila.



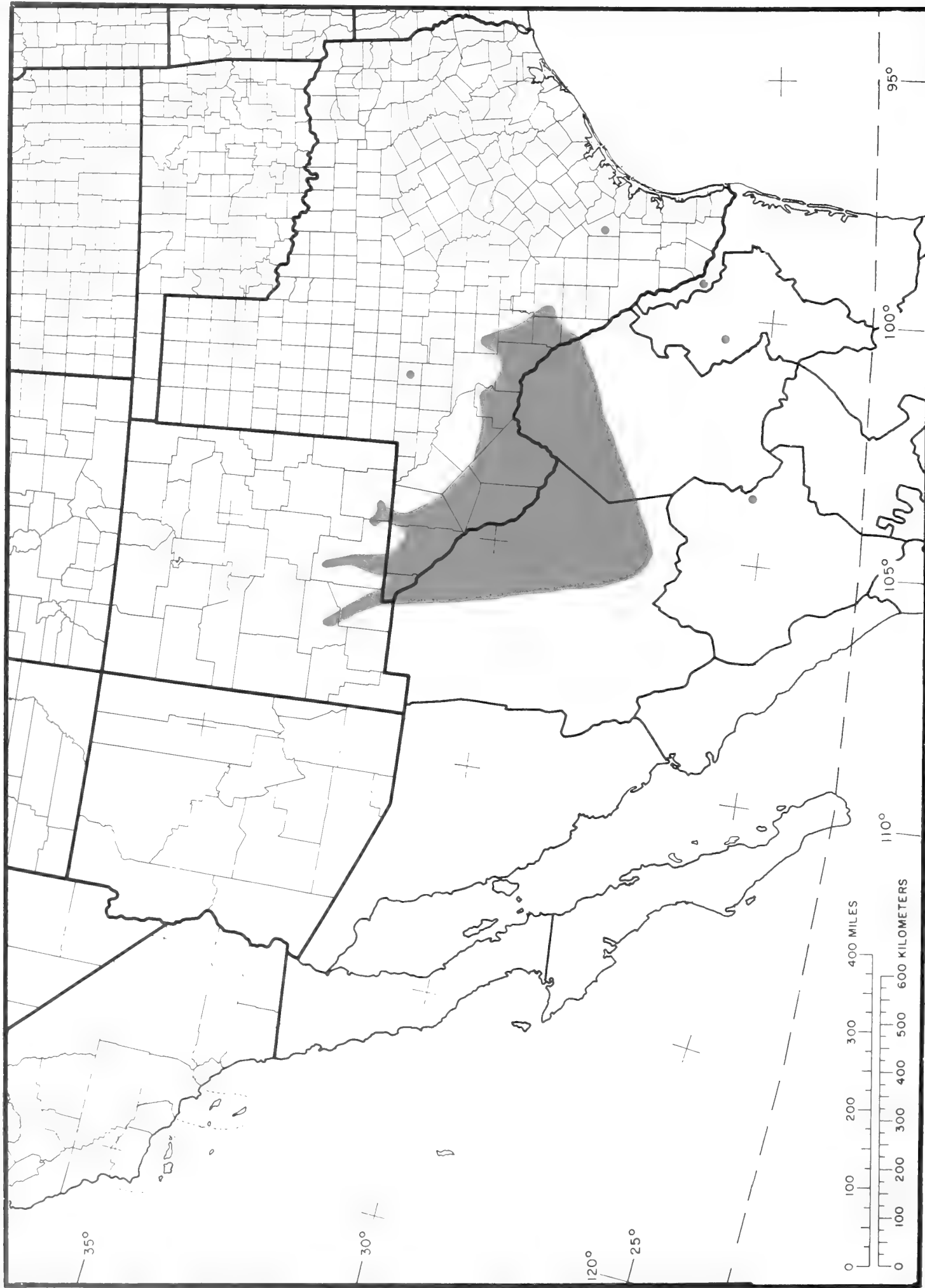
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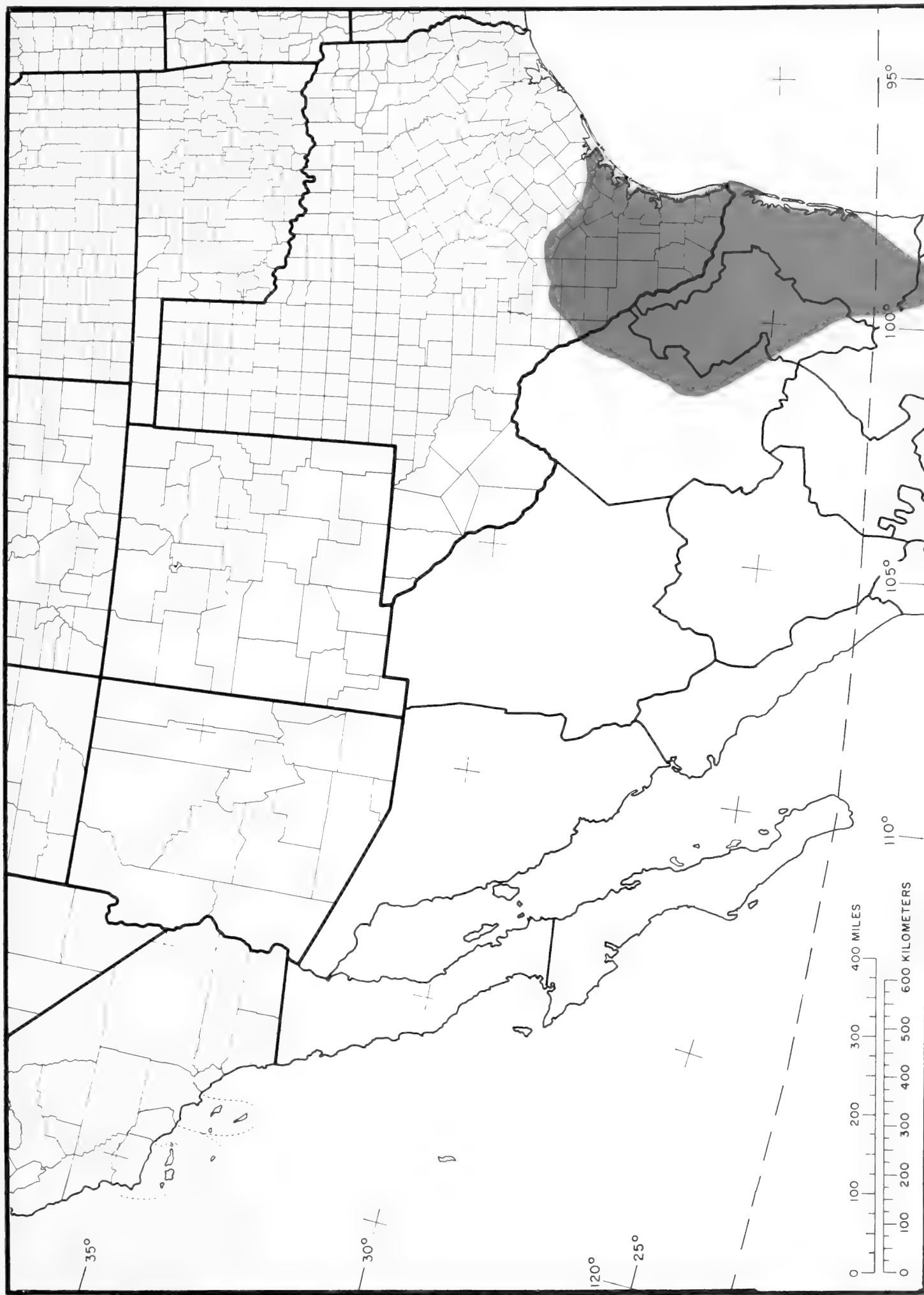
Map 207. *Yucca rostrata* Engelm., beaked yucca. Trans-Pecos Texas and Coahuila.



Map 208. *Yucca schottii* Engelm., Schott's yucca. Extreme southwestern New Mexico, southeastern Arizona, northeastern Sonora, and northwestern Chihuahua.



Map 209. *Yuca torreyi* Shafer, *Torrey yucca*.



Map 210. *Yucca treculeana* Carr., Trecul yucca. Southern Texas and northeastern Mexico.

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Numbers refer to maps. Where there is more than one for a species, the number is followed by a letter for the base map: W (Western United States, vertical), NW (Northwestern United States, horizontal), SW (Southwestern United States, horizontal), and N (North America).

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ABOUT THE FOREST SERVICE

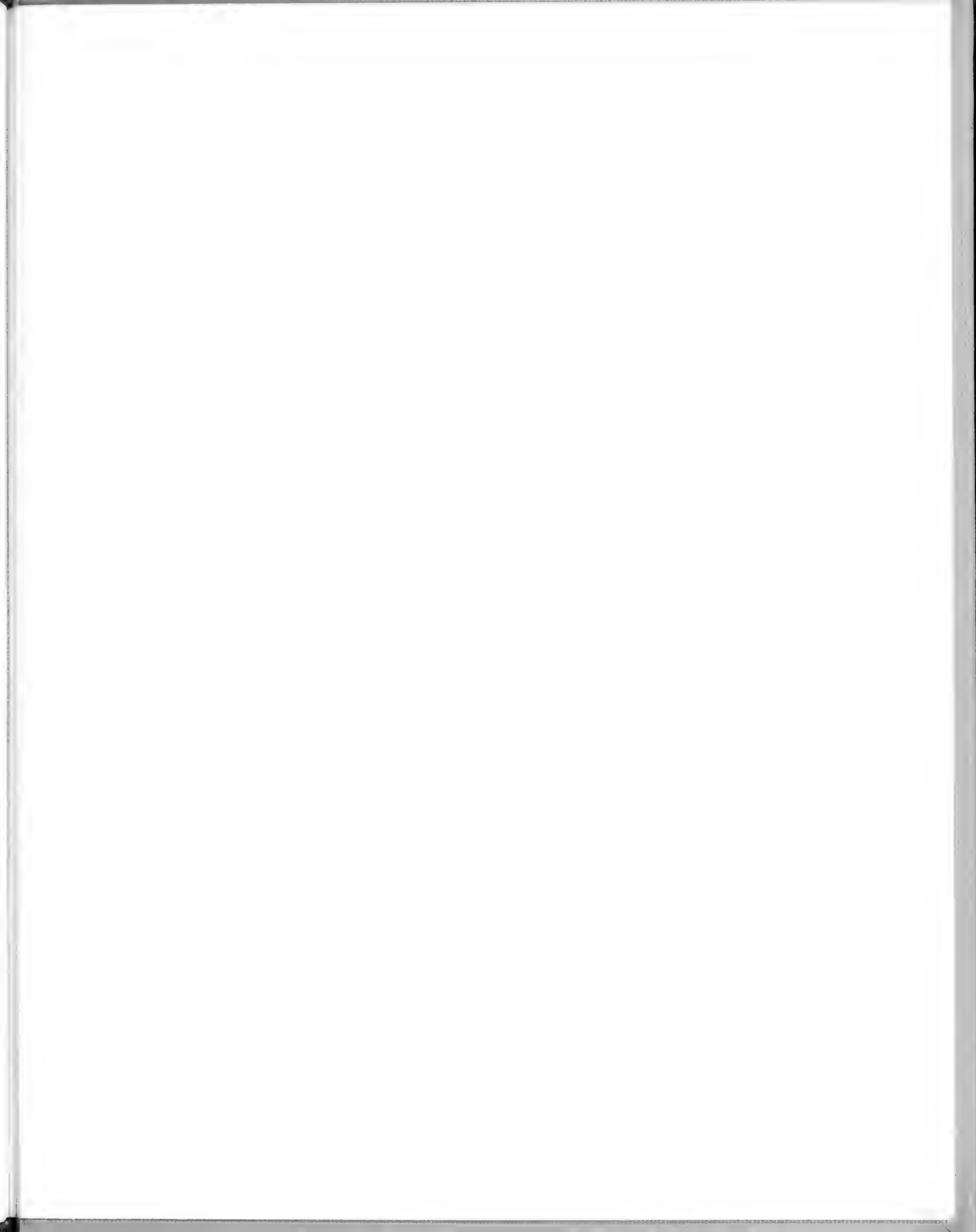
As our Nation grows, people expect and need more from their forests—more wood; more water, fish and wildlife; more recreation and natural beauty; more special forest products and forage. The Forest Service of the U.S. Department of Agriculture helps to fulfill these expectations and needs through three major activities.

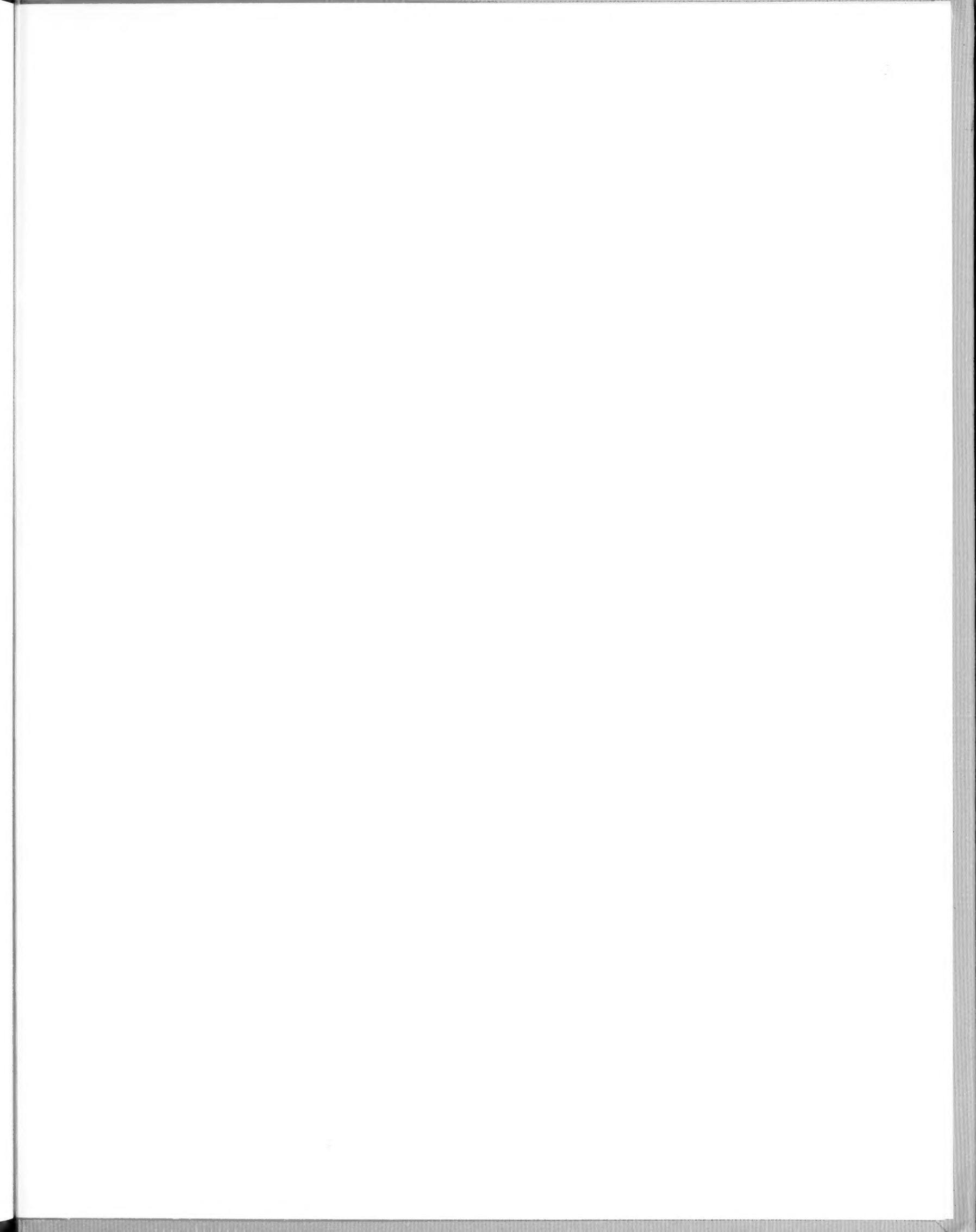
- Conducting forest and range research at over 75 locations ranging from Puerto Rico to Alaska to Hawaii.
- Participating with all State forestry agencies in cooperative programs to protect, improve, and wisely use our Country's 395 million acres of State, local, and private forest lands.
- Managing and protecting the 187-million acre National Forest System.

The Forest Service does this by encouraging use of the new knowledge that research scientists develop; by setting an example in managing, under sustained yield, the National Forests and Grasslands for multiple use purposes; and by cooperating with all States and with private citizens in their efforts to achieve better management, protection, and use of forest resources.

For more than 70 years, the Forest Service has been serving the Nation as a leading natural resource conservation agency.







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